

# SVAN 979

Sound & Vibration

ANALYSER

**USER'S MANUAL**



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**Notice:** This user's manual presents the software revision named 1.26.3 (cf. the description of the **Unit Label** position of the **Instrument** list). The succeeding software revisions (marked with the bigger numbers) can slightly change the view of some displays presented in the text of the manual.

## CONTENTS

<b>1. INTRODUCTION</b>	<b>7</b>
1.1. SVAN 979 as Sound Level Meter & Analyser	Error! Bookmark not defined.
1.3. SVAN 979 as Vibration Level Meter & Analyser	Error! Bookmark not defined.
1.5. General features of SVAN 979	Error! Bookmark not defined.
1.7. Accessories included	Error! Bookmark not defined.
1.9. Accessories available	Error! Bookmark not defined.
1.11. Software options available	Error! Bookmark not defined.
<b>2. MANUAL CONTROL OF THE INSTRUMENT</b>	<b>10</b>
2.1 Control push-buttons on the front panel	10
2.2 Input and output sockets of the instrument	13
<b>3. SETTING THE INSTRUMENT</b>	<b>15</b>
3.1. Basis of the instrument's control	15
3.2. Powering of the instrument	17
3.3. Initial Setup of the instrument	18
3.4. Description of icons	19
3.5. Memory organisation	20
<b>4. FUNCTIONS OF THE INSTRUMENT – Function</b>	<b>22</b>
4.1. Selecting the mode of the instrument – Mode	22
4.2. Measurement functions of the instrument – Measurement Function	22
4.3. Instrument's calibration – Calibration	23
4.3.1. Calibration by Sensitivity in the case of Acoustic signal	23
4.3.2. Calibration by Sensitivity in the case of Vibration signal	24
4.3.3. Calibration By Measurement in the case of acoustic signal	24
4.3.4. Calibration By Measurement in the case of vibration signal	26
4.3.5. History of the calibrations - Last Calibration	26
4.3.6. Clear calibration records - Clear Calibr. History	27
<b>5. MEASUREMENT PARAMETERS SETTING – Measurement</b>	<b>28</b>
5.1 Selection of measurement parameters - General Settings	28
5.2 Measure trigger parameters selection – Measure Trigger	30
5.3 Setting parameters in a profile – Profiles	31
5.4 Setting the data logging functionality – Logging	32
5.4.1 Data logger programming – Logger Setup	33
5.4.2 Results selection – Logger Results	34
5.4.3 Logger trigger parameters setup – Logger Trigger	35
5.4.4 Event recording setup – Event Recording	36
5.4.5 The marker setup – Marker Setup	37
5.4.6 Wave recording setup – Wave Recording	38
5.5 Selection the 1/1 Octave - 1/12 Octave spectrum parameters – Spectrum	39
5.6 Selection of the microphone compensation filters – Compensation Filter	40

5.7	Measurement range setting – Range	41
5.8	Exposure time setting - Exposure Time	41
5.9	Setting ten statistical levels - Statistical Levels	42
5.10	Programming the instrument's internal timer – Timer	42
5.11	Description of an exemple timer function	43
<b>6.</b>	<b>DATA AVAILABLE ON THE DISPLAY – Display</b>	<b>45</b>
6.1	Selection of the modes of measurement results presentation - Display Modes	45
6.2	Setting scale and grid of the plot - Display Scale	51
6.3	Setting the parameters of the logger files presentation - Logger View	52
6.4	Setting the display brightness and power saver- Screen	53
6.5	Setting the colour theme of the display – Themes	54
<b>7.</b>	<b>SAVING THE MEASUREMENT RESULTS – File</b>	<b>55</b>
7.1	Saving files - Save and Save Next	56
7.2	Managing the files saved in the internal and external memory – File Manager	57
7.2.1	Setting the directory for saving files – Set Working Directory	58
7.2.2	Creating new catalogue and new file	58
7.2.3	Deleting all files from Internal memory – Delete All	59
7.2.4	Defragmentation of the internal memory – Defragmentation	59
7.2.5	Opening file/catalogue – Open	60
7.2.6	Copying file/catalogue – Copy	60
7.2.7	Moving file/catalogue – Move	60
7.2.8	Renaming file/catalogue – Rename	61
7.2.9	Information about file/catalogue – Info	61
7.2.10	Deleting file/catalogue – Delete	61
7.3	Managing the setup files – Setup Manager	61
7.3.1	Saving the setup files	62
7.3.2	Operations on the setup files	62
7.4	Controlling the data storing in the instrument's memory - Save Options	63
<b>8.</b>	<b>SETTINGS OF THE INSTRUMENT PARAMETERS – Instrument</b>	<b>66</b>
8.1.	Checking the state of the internal battery – Battery	66
8.2.	Bluetooth activation – Bluetooth	67
8.3.	Selection of the active port - Communication Ports	67
8.4.	Setting the external power parameters - External Power	68
8.5.	Setting the GPS parameters – GPS	68
8.6.	Selection of the IEPE current supply - IEPE Current	68
8.7.	Selection of keyboard modes – Keyboard Settings	68
8.8.	Checking the modem status – Modem Status	69
8.9.	Setting parameters of the I/O port - Multifunction I/O	69
8.10.	Setting the microphone polarisation voltage – Polarisation Voltage	71
8.11.	Remote control mode configuration – Remote Control Mode	71
8.12.	Setting the parameters of the serial interface - RS232	72

8.13.	Programming the instrument's internal Real Time Clock – RTC	72
8.14.	Checking the instrument's vibration – Self Vibration	73
8.15.	Signal generator activation – Signal Generator	73
8.16.	Parameters of remote communication - Wireless Transfer	73
8.16.1.	Selection of the network type – Network	73
8.16.2.	Selection of the data transfer type - Data	74
8.16.3.	Configuration of modem basic settings – Modem	74
8.16.4.	Setting of support modem options - Modem Connection	75
8.16.5.	Configuration of SMS service - SMS Option	76
8.16.6.	Configuration of e-mail service - E-mail	77
8.16.7.	Data transfer with the Modbus protocol – Modbus	77
8.17.	Checking specification of the instrument - Unit Label	78
<b>9.</b>	<b>AUXILIARY SETTINGS – Auxiliary Setup</b>	<b>79</b>
9.1.	Setting the language of the user interface – Language	79
9.2.	Return to the factory settings – Factory Settings	79
9.3.	Reference signal in vibration measurements - Reference Levels	80
9.4.	Setting the coefficients of the user filters - User Filters	80
9.4.1	Introduction the parameters of real time filters - Real Time Filters	80
9.5.	Selection of the Vibration units - Vibration Units	81
9.6.	Warnings setup – Warnings	81
<b>10.</b>	<b>REPORTS PRINTING – Report</b>	<b>84</b>
10.1.	Printing the measurement results - Print Results	85
10.2.	Printing the statistics of sound measurement results - Print Statistics	86
10.3.	Printing the coefficients of the user filters - Print User Filters	86
10.4.	Selection the printing options – Options	86
<b>11.</b>	<b>1/1, 1/3, 1/6 AND 1/12 OCTAVE ANALYSER</b>	<b>88</b>
11.1.	Selection of 1/1 Octave or 1/3 Octave analysis mode	88
11.2.	Selecting the parameters of 1/1 Octave - 1/12 Octave analysis	88
11.3.	Measurement range selection - Range	89
11.4.	Pre-weighting filter and frequency band selection - Spectrum	89
11.5.	Saving of 1/1 Octave and 1/3 Octave analysis results - Logger Results	90
11.6.	Selecting the result which triggers recording for the logger in 1/1 Octave - 1/12 Octave analysis - Logger Trigger	90
11.7.	Display options in 1/1 Octave - 1/12 Octave analysis mode	90
11.8.	Presentation of 1/1 Octave - 1/12 Octave analysis results	91
11.9.	Setting the scale of spectrum presentation - Scale	92
11.10.	Setting the parameters of the spectrum presentation - Spectrum View	93

11.11.	Selection of the Spectrum Type in Vibration mode - Spectrum Type	94
11.12.	Setting filter coefficients for 1/1 Octave - 1/12 Octave analysis - Spectrum Based Filter	94
11.13.	Setting the parameter for spectrum comparison – Spectrum Compare	95
<b>12.</b>	<b>FFT ANALYSER</b>	<b>98</b>
12.1.	Selection of FFT analysis mode	98
12.2.	Selecting the parameters of FFT analysis	98
12.3.	Measurement range selection - Range	98
12.4.	Setting the parameters of FFT analysis - FFT	99
12.5.	Saving of FFT analysis results - Logger Results	99
12.6.	Display options in FFT analysis mode	99
12.7.	Presentation of FFT analysis results	100
12.8.	Setting the scale of spectrum presentation - Scale	100
12.9.	Setting the parameters of the spectrum presentation - Spectrum View	102
12.10.	Selection of the Spectrum Type in Vibration mode - Spectrum Type	102

## 1. INTRODUCTION

The **SVAN 979** is an all digital, Type 1 Sound & Vibration level meter (SLM and VLM) as well as a real time 1/1, 1/3, 1/6 or 1/12 octave analyser. The instrument is designed for general acoustic and vibration measurements, environmental monitoring, occupational health and safety monitoring.

Three acoustic or vibration user configurable profiles allow parallel measurements with independently defined frequency filters and RMS detector time constants. Each profile provides a significant number of results (like **Spl, Leq, Sel, Lden, LEPd, Ltm3, Ltm5, LN%, LR15, LR60, Ovl, Peak, Max, Min** in case of sound measurements or **RMS, Ovl, Peak, P-P, VDV, MTVV** in case of vibration measurements). Advanced time history logging for each profile provides complete information about the measured signal using the external SD-card or USB Memory Stick and can be easily downloaded to any Windows™ PC using the USB interface and SvanPC++ software.

All required frequency weighting filters (e.g.: **A, B, C, G, Z** in case of sound measurements and **Wh** in case of vibration measurements) including the latest ISO 2631-1&2 standard are available with this instrument. General vibration measurements (acceleration, velocity and displacement) and Human Vibration Measurements, HVM, meeting ISO 8041:2005 standard are also available. The RMQ detector enables direct measurement of the Vibration Dose Value (**VDV**).

Using the computational power of its digital signal processor the **SVAN 979** instrument can, simultaneously to the meter mode, perform real time **1/1 Octave, 1/3 Octave, 1/6 Octave** or **1/12 Octave** analysis including the calculation of **10 x LN%** statistical levels.



The following functions are also available as options: FFT analysis, Tonality analysis, Reverberation Time (RT60) measurements, AEM measurements and User programmable second order band pass filters. Time history logging of 1/1 Octave, 1/3 Octave, 1/6 Octave, 1/12 Octave and FFT analysis is also provided.

Time domain waveform signal recording on the external SD-card or USB memory stick is available to capture the raw input signal. Advanced trigger and alarm functions are available in the standard version of this one channel instrument from Svantek.

A fast USB 1.1 interface (12 MHz) creates a real time link for the PC "front-end" application using the **SVAN 979**. The **USB Host** functionality is also available. The USB Host controller installed in the instrument enables the user to connect this meter to USB memory sticks, USB hard disks, USB printers etc. With the use of optional interfaces (RS 232, Bluetooth or IrDA) the instrument can be remotely controlled from the PC. Measurement results can be downloaded to the PC using all the interfaces mentioned above.

The instrument is powered from four AA standard alkaline or rechargeable batteries (i.e. NiMH - separate charger is required). Powering the instrument from an External DC power source or the USB interface is also possible. A robust and lightweight design enhances the exceptional features of this new generation of sound and vibration measurement instrument.

### 1.1. SVAN 979 as a Sound Level Meter & Analyser

- noise measurements (**Spl, Lmax, Lmin, Lpeak, Leq, Sel, Lden, LEPd, Ltm3, Ltm5** and 10 x **LN%** statistics) with Type 1 IEC 61672:2002 accuracy in the frequency range 3.15 Hz ÷ 20 kHz with GRAS 40AE microphone
- parallel **Impulse, Fast** and **Slow** detectors for the measurements with **A, B, C, G, Z** frequency filters
- two measurement ranges 22 dB RMS(A) ÷ 123 dB Peak (**Low**) and 30 dB RMS(A) ÷ 140 dB Peak (**High**)
- **1/1 Octave** (15 filters with centre frequencies 1 Hz ÷ 16 kHz, Type 1 – IEC 1260), **1/3 Octave** (45 filters with centre frequencies 0.8 Hz ÷ 20 kHz), **1/6 Octave** (90 filters with centre frequencies 0.73 Hz

÷ 21.4 kHz) and **1/12 Octave** (180 filters with centre frequencies 0.71 Hz ÷ 22 kHz) real time analysis  
- all with Type 1 – IEC 1260 filters.

## 1.2. SVAN 979 as a Vibration Level Meter & Analyser

- General Vibration measurements (acceleration, velocity and displacement) and optionally HVM meeting ISO 8041:2005 and ISO 10816-1 standards in the frequency range depending on the parameters of the attached accelerometer, i.e. with DYTRAN 3185D general purpose transducer is equal to 2Hz ÷ 20 kHz
- parallel **RMS**, **VDV**, **MTVV** or **Max**, **Peak**, **Peak–Peak** measurements
- **Z**, **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10**, **Wh** weighting filters
- **1/1 Octave** (15 filters with centre frequencies 1 Hz ÷ 16 kHz, Type 1 – IEC 1260), **1/3 Octave** (45 filters with centre frequencies 0.8 Hz ÷ 20 kHz), **1/6 Octave** (90 filters with centre frequencies 0.73 Hz ÷ 21.4 kHz) and **1/12 Octave** (180 filters with centre frequencies 0.71 Hz ÷ 22 kHz) real time analysis -with all Type 1 – IEC 1260 filters.

## 1.3. General features of SVAN 979

- Advanced **Data Logger** including spectrum logging on the micro **SD-card** or **USB Memory Stick** providing almost unlimited logging capacity
- Time domain waveform signal recording (option)
- Advanced trigger and alarm functions
- **USB 1.1 Host & Client interface** (real time PC "front end" application supported)
- **RS 232** (as option) and **Bluetooth** (as standard) interface
- Integration time programmable up to **24 h**
- Power supply by **four AA** rechargeable or standard alkaline batteries
- Hand held, light weight and robust case
- Easy to use with menu driven user interface

## 1.4. Accessories included

- **GRAS 40AE** - prepolarised ½" free field microphone with nominal sensitivity 50 mV/Pa
- **SV 17** - microphone preamplifier 7 pin Lemo connector
- **SA 22** – foam windscreen
- **SC 16** - USB 1.1 cable
- **SC 59** - I/O cable
- four **AA** alkaline batteries
- **SvanPC++** - download and viewing software for Windows 2000/XP/Vista/Win 8 operating systems

## 1.5. Accessories available

- **SA 17A** - external battery pack using 6 x AA batteries
- **SA 143** - carrying case for SVAN 95x and accessories (lightweight)
- **SA 79** - carrying case for SVAN 9xx and accessories (waterproof)
- **SA 46** - carrying belt-bag for SVAN 94x and SVAN 95x (leather)
- **SA 47** - carrying bag for SVAN 95x and accessories (fabric material)
- **SV 55** - RS 232 option for the SVAN 955

## 1.6. Firmware options available

- **SVAN979** - SVAN 979 including 1/1 and 1/3 octave analysis
- **SV 979\_4** - FFT analysis option for the SVAN 979
- **SV 979\_5** - RT60 option for the SVAN 979
- **SV 979\_6** - Tonality analysis option for the SVAN 979
- **SV 979\_15** – Time domain waveform signal recording (\*.srt or \*.wav format)



- **SV 979\_16** - User programmable second order band pass filters\*



**Notice:** *The firmware options for the instrument can be purchased at any time as only the introduction of a special unlock code is required for their activation in a specific instrument. Contact your local Svantek distributor for further information and costs for these options.*

## 2. MANUAL CONTROL OF THE INSTRUMENT

Control of the instrument has been developed in a fully interactive manner. The user can operate the instrument by selecting the appropriate position from the selected **Menu** list. Thanks to that, the number of push-buttons for control of the instrument has been reduced to nine for ease of use and convenience.

### 2.1 Control push-buttons on the front panel

The following control push-buttons are located on the front panel of the instrument:

- **<ENTER>**, (**<Menu>**), [**<Save>**],
- **<ESC>**, (**<Cal.>**), [**<S/P>**],
- **<Shift>**, [Markers]
- **<Alt>**, [Markers]
- **<^>**,
- **<^>**,
- **<^>**,
- **<^>**,
- **<Start/Stop>**.

The name given in (...) brackets denotes the second push-button function which is available after pressing it in conjunction (or in sequence) with the **<Shift>** push-button. For the first two push-buttons the name given in square brackets [...] denotes also the third push-button function which is available after pressing it in conjunction (or in sequence) with the **<Alt>** push-button.



#### **<Shift>**

The second function of a push-button (written in red colour on a push-button) can be used when the **<Shift>** push-button is pressed. This push-button can be used in two different ways:

- as **Shift** like with a computer keyboard (e.g. while typing the filename); both **<Shift>** and the second push-button must be pressed together (two finger operation);
- as **2nd Fun**; this push-button can be pressed and released before pressing the second one or pressed in parallel (while operating in “**2nd Fun**” mode, see the following notice) with the second push-button (one finger operation).

The **<Shift>** push-button pressed in conjunction with **<Alt>** enables the user to activate the **Markers** on the plots during the measurement.

#### **<Alt>**

This push-button enables the user to choose the third push-button function in case of [**<Save>**] and [**<Pause>**] push-buttons. In order to select the third function the user must press the **<Alt>** and the second push-button simultaneously.



**Notice:** Simultaneously pressing the **<Alt>** and **<Start/Stop>** push-buttons switches the instrument on or off.

#### **<Start/Stop>**

This push-button enables the user to start the measurement process, when the instrument is not measuring or to stop it, when the instrument is in course of the measurement. It is also possible to set the mode of this push-button such that in order

to start or stop the measurements the user has to press it simultaneously with the **<Shift>** push-button. This can prevent accidentally starting or stopping a measurement at the wrong time by just brushing against the Start/Stop button on its own.



**Notice:** Changing the **<Start/Stop>** push-button mode is performed in the **Keyboard Settings** window of the **Instrument** list (see description of the **Instrument** list).

- <ENTER>** This push-button enables the user to enter the selected position shown on the screen Menu list or to confirm selected settings. Some additional functions of this push-button will be described in the following chapters of this manual.
- (<Menu>)** This push-button (pressed together with **<Shift>**) enables the user to enter the main list containing seven sub-lists: **Function**, **Measurement**, **Display**, **File**, **Instrument**, **Auxiliary Setup** and **Report**. Each of the above mentioned menu lists consists of sub-lists, elements and data windows. These main sub-lists will be described in detail in the following chapters of the manual. Double pressing the **<Menu>** push-button enters a list containing the last eight opened sub-lists. It often speeds up the control of the instrument as the user has faster access to the most frequently used sub-lists for easy navigation.
- [<Save>]** This push-button (pressed together with **<Alt>**) enables the user to save measurement results as a file in the instrument's internal memory or on the SD-card or USB memory stick. There are two available functions: **Save Next** - save a file with the name increased by one (e.g. 02JAN0, 02JAN1, 02JAN3) and **Save** - save a file with the edited name.
- <ESC>** This push-button closes the control lists, sub-lists or windows. It acts in an opposite way to the **<ENTER>** push-button. When the window is closed after pressing the **<ESC>** push-button, any changes made in it are ignored in almost all cases.
- (<Cal.>)** This push-button (pressed together with **<Shift>**) opens the **Calibration** sub-list.
- [<S/P>]** This push-button enables the user to pause or break the measurement process temporarily. If there is no current running measurement in progress this push-button opens the Setup Manager menu.
- <◀>, <▶>** These push-buttons enable the user specifically to:
- select the column in a multi column parameter list;
  - select the parameters value in an active position (e.g. filter **Z**, **A**, **B** or **C**, Integration period: **1s**, **2s**, **3s** ... etc.);
  - control the cursor in Spectrum, Logger and Statistics modes of result's presentation;
  - select the position of the character in the text editing screen;
  - activate markers 2 and 3
  - speed up changing the numerical values of the parameters when pressed and held.
- (<◀>, <▶>)** The **<◀>**, **<▶>** push-buttons pressed in conjunction (or in sequence) with **<Shift>** enable the user specifically to:
- change the parameters value with double step (e.g. Start Delay period: form **1s** to **11s**, **21s** ... etc.);
  - to shift cursor from the first to the last position and back on the graphical presentation mode (except 1/6 and 1/12 octave spectrum presentation);
  - zoom in or zoom out in the 1/6 and 1/12 octave spectrum presentation modes.
- [<◀>, <▶>]** The **<◀>**, **<▶>** push-buttons pressed in conjunction (or in sequence) with **<Alt>** enable the user specifically to:
- select the parameters value in an active position in the matrix parameter list;
  - select the parameters value in an active position (e.g. filter **Z**, **A**, **B** or **C**, Start Delay period: **1s**, **2s**, **3s** ... etc.);
  - insert or delete a character in the text edition screen.
- <^>, <^>** The **<^>**, **<^>** push-buttons enable the user specifically to:
- select lines in the list;

- select the correct character from the list in the text edition screen;
- activate markers 1 and 4

(<^>, <v>)

The <^>, <v> push-buttons pressed in conjunction (or in sequence) with <Shift> enable the user specifically to:

- shift the cursor from the first to the last position and back on the menu list;
- change the relationship between the Y-axis and X-axis of all plots presented on the screen.

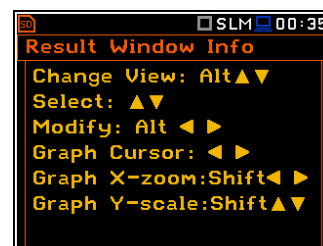
[<^>, <v>]

The <^>, <v> push-buttons pressed in conjunction (or in sequence) with <Alt> enable the user specifically to:

- change the mode of result presentation;
- programme the Real Time Clock (RTC) and Timer.

[Info]

The <Info> push-button (simultaneous pressing the <^>, <v> push-buttons) opens the window with the help information in the measurement display modes. Press <ESC> or <ENTER> to exit the Info screen.



[Markers]

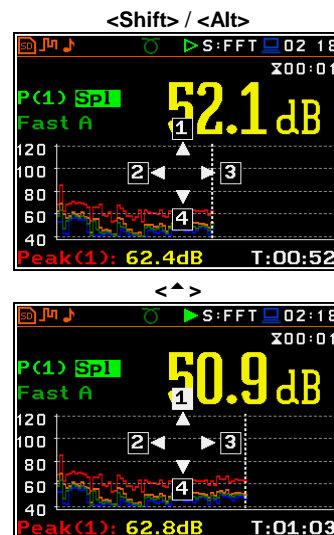
The **Markers** enable the user to mark special events, which occurred during the performed measurements (i.e. the airplane flight, the dog barking, the train's drive etc.). In order to activate the markers the logger has to be switched on (*path: <Menu> / Measurement / General Settings / Logging / Logger Setup*) and one or more logger results (**Peak**, **Max**, **Min**, **Leq** for sound measurements or **Peak**, **P-P**, **Max**, **RMS** for Vibration measurements) in profiles have to be activated (*path: <Menu> / Measurement / General Settings / Logging / Logger Results*).

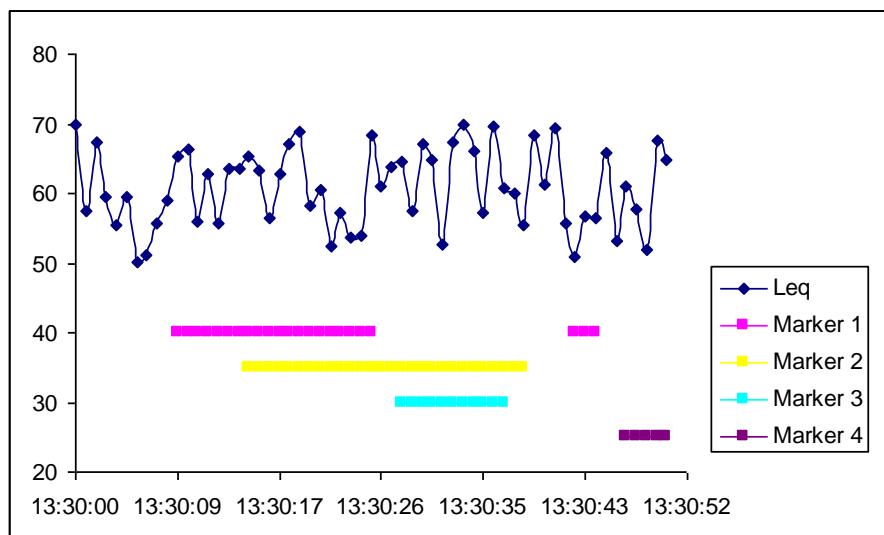
In order to enter the marker mode the user must press <Shift> and <Alt> push-buttons simultaneously during the measurement. Then four available markers appear on the screen. To choose marker number 1 the user must press <^> push button (number 2 - <^>, number 3 <v> and number 4 - <v>).

The markers disappear automatically and the chosen marker is activated (after pressing <Shift> + <Alt> again active marker number will be highlighted). In order to switch off the marker, the user has to press <Shift> + <Alt> and press the arrow push-button, which refers to the marker to be switched off.

The current state of the markers is indicated in the logger file (cf. App. B for details) and can be used to show them with the help of the dedicated presentation software.

An example presentation of the markers on the time history plot is shown below (to view a plot with markers the user has to transfer data to the appropriate software such as SvanPC++).





## 2.2 Input and output sockets of the instrument

### Top cover of the instrument

The measurement input is placed in the centre of the instrument's top cover. It is the Lemo-7 compatible socket. The **SV 17** microphone preamplifier has a specially designed matching plug and a locking screw to secure the preamplifier to the meter body. The accelerometers have to be connected to the instrument also using the Lemo-7 connector. After connecting the preamplifier or the accelerometer cable to the measurement input, the screw should be tightened to light resistance only. Do not over tighten this connector. It is not necessary to remove this preamplifier from the top of the instrument unless the meter is in a calibration laboratory as it is always used close coupled to the meter body. The full description of the signals connected to the sockets is given in Appendix C.



### Bottom cover of the instrument

In the bottom cover there are four sockets, placed from the right to the left as follows: **Ext. 6-24Vdc**, **USB Host**, **USB Device** and **I/O**.

There is a micro SD memory-card socket under the bottom cover of the instrument and spaces for the 4 x AA batteries.

The **USB Device** 1.1 interface is the serial interface working with 12 MHz clock. Thanks to its speed, it is widely used in all PC. In the instrument, the standard 4-pin socket is used and described in detail in Appendix C.

The **USB Host** interface can be used to connect an external USB Memory Stick or USB hard disk, enabling the device to register virtually infinite sequence of measurement results.

The additional multi-purpose input / output socket, called **I/O**, is a two-pin LEMO socket. On this socket, in the case when the Analogue Output functionality is selected, the signal from the input of the analogue / digital converter (before any frequency correction) is available. This signal can be recorded using magnetic recorder or observed on the oscilloscope. The

Digital Input is another functionality that serves as the external trigger to the instrument, while the Digital Output is used to generate the trigger pulse or alarm pulse from the instrument.

The user can connect an external DC power 6-24V adapter to the **6-24V** socket located on the bottom cover of the instrument. The current consumption depends on the voltage of the power supplier.



**Notice:** Switch the power off before connecting the instrument to any other device (e.g. a printer or a Personal Computer).

### 3. SETTING THE INSTRUMENT

In order to perform measurements using the instrument the user only has to plug-in the preamplifier with the microphone already screwed on or the proper vibration transducer and to switch the power on by pressing of the **<Alt>** and **<Start/Stop>** push-buttons at the same time. Hold both buttons down for 1 or 2 seconds and release to switch on.

#### 3.1. Basis of the instrument's control

The instrument is controlled by means of nine push-buttons on the keyboard. Using these push-buttons the user can access all available functions and change the value of all available parameters. The functions are placed in a system of lists and sub-lists.

The instrument's menu consists of different type of windows, which include: main menu list, sub-menu list, option list, parameter list, text editor window, information window and file manager window with file command list.

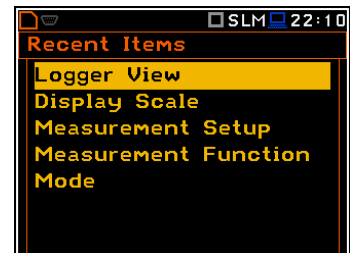
##### Main menu

The main list contains the headers of seven lists, which also contain sub-lists or positions (elements). The main list is opened after pressing the **<Menu>** push-button. This list contains the following sub-lists: **Function**, **Measurement**, **Display**, **File**, **Instrument**, **Auxiliary Setup** and **Report**.



##### Recent Items list

Double pressing the **<Menu>** push-button opens the list of recently accessed menu items. This enables the user to access the most frequently used lists quickly, without the necessity of passing through the whole menu path.



##### Position selection

The desired position in menu list is selecting using the **<^>** or **<v>** push-buttons.



<^>

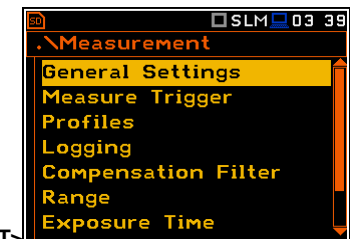


##### Entering selected position

After selection of the desired position in the menu list, the user has to press the **<ENTER>** push-button in order to enter it. After this operation a new sub-menu, option list, parameter list or information window appears on the display.



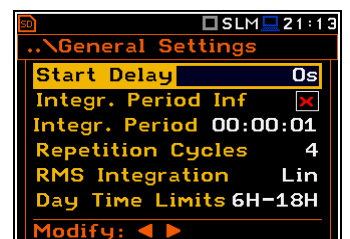
<ENT>



##### List of parameters

The parameter list contains parameters for which the user may select the value from the available range. Pressing the **<ENTER>** push-button enables the user to access the above mentioned sub-lists.

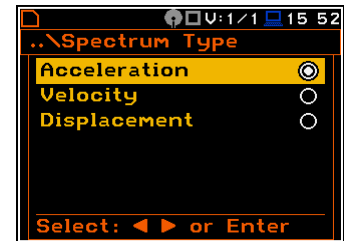
- The desired position in a list is accessed after pressing the **<^>** or **<v>** push-button.



- The change of the value in a selected position is performed by the <◀> or <▶> push-buttons (or pressed together with <Shift>).

### Option list

The option list consists of different choices, from which only one may be selected. The selection of the option is performed as follows. The user has to highlight the desired option by means of the <▲> or <▼> push-buttons and then press <ENTER>. This option became active and the list is closed. When the user re-enters this list again the last selected option will be marked.



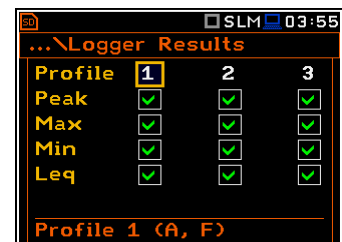
If the parameter has a numerical value the user may keep pressing the <◀> or <▶> push-buttons (or pressed together with <Shift>) longer than 1 second to speed up the selection. In this case the parameter starts to change automatically until the user releases the pressed buttons.

The user may change the numerical parameter value with a larger step (usually 10, 20) by means of the <◀> or <▶> push-buttons pressed together with <Alt>.

### Matrix of parameters

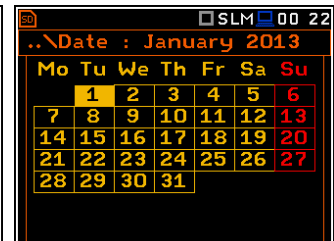
When the list of parameters consists of more than one column the user may change:

- column by means of <◀> or <▶>
- line in the same column by means of <▲> or <▼>
- value in a selected position by means of <◀> or <▶> with <Alt>
- all values in the same column by means of <▲> or <▼> with <Shift>
- all values in the same line by means of <◀> or <▶> with <Shift>.



### Complex parameters

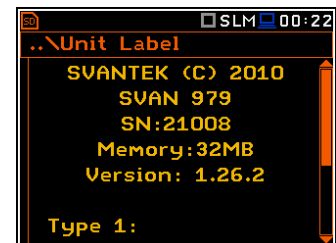
Some parameters like **Start Hour**, **Start Day** etc. are complex (consisting of more than one value field). The selection of values for such parameters is performed in a special window, which is opened with the <◀> or <▶> push-buttons. In the special window the value is selected with the f <◀>, <▶> or <▲>, <▼> push-buttons and then is confirmed by pressing <ENTER>.



In all cases the <ENTER> push-button is used for confirmation of the selection in a position and for closing the opened sub-list. The sub-list is closed ignoring any changes made the list by pressing the <ESC> push-button and the user returns to the previous menu.

### Information window

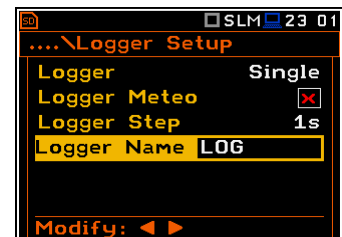
Some windows inform the user about the state of the instrument, available memory, none existing files or loggers, standards fulfilled by the unit, etc. In order to scroll through the list, the user has to use the <▲> or <▼> push-button. In order to close such a window, the user has to press <ESC>.



### Text editing window

There are also windows, in which the user may edit some text (i.e. the name of the file). This window contains help information to guide the user how to edit the text. The character which is displayed inversely may be edited.

- The user can select the position of the character in the edited text using the <◀>, <▶> push-buttons.
- The available ASCII characters can be changed using the <▲> or <▼> push-button. The subsequent digits, underline, upper case letters and



<▶>

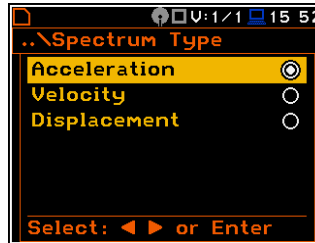


space appear on the display in the inversely displayed position after each press of the above mentioned push-buttons.

- The user can insert or delete the position in the edited text using the <◀>, <▶> push-buttons pressed together with <Alt>.

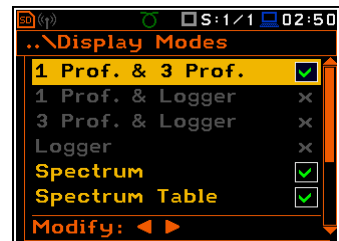
### Help information

In most windows the last line or several lines at the bottom of the screen contain help information. It informs the user how to select or modify the parameter's value, change the character in the text line etc.



### Inactive parameters

If some functions or parameters are not available, the positions in the menu or parameter lists linked with this function or parameter became inactive (their colour became grey). For example, if **Logger** (path: <Menu> / Measurement / Logging / Logger Setup) is switched off the **Logger** presentation mode is not active!



## 3.2. Powering of the instrument

The **SVAN 979** can be powered by one of the following sources:

- External DC power source – 6 V DC-24 V DC (1.5 W)
- SA 17A external battery pack – operation time > 24 h (option)
- Four AA standard size internal batteries. In the case of alkaline type, a new fully charged set can operate more than 12 h (6.0 V / 1.6 Ah). Instead of the ordinary, four AA rechargeable batteries can be used (a separate external charger is required for charging them). In this case, using the best NiMH type, the operation time can be increased up to 16 h (4.8 V / 2.6 Ah)
- **USB** interface – 500 mA HUB

For each of the three kinds of possible power source there is a different view presented in the **Battery** window of the **Instrument** list.

When the instrument is powered from its internal batteries, the **“Battery”** icon is presented on the top line of the display. When the voltage of the batteries is too low for reliable measurements, the icon is red or during attempt to switch the instrument on the **Low Battery!** message occurs on the display for 2 seconds and the instrument switches off by itself. To change the batteries the user has to switch off the instrument, unscrew and take off the black bottom cover of the instrument, slide the battery tubes out, change the batteries taking care to observe the correct polarity and reassemble the parts of the instrument. A fully charged set of 4 batteries ensures more than 12 hours of continuous operation of the instrument (with **Dim LCD** switched on). The battery condition can be checked by means of the **Battery** function. It is also presented continuously on the top line of the display by means of the **“Battery”** icon.

When there is a connection to the USB interface (**USB Device** socket is connected by means of the cable to a PC), the **“Computer”** icon is presented on the top of the display and in the **Battery** window, there is the **USB Power: Voltage: x.xxV** message.



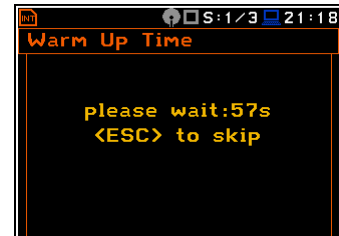
**Notice:** In the case when **“Battery”** icon is red, it is strongly recommended to use an external power adapter or USB interface as soon as possible to ensure reliable operation. If no suitable external power source is provided the instrument will be switched off automatically after a short time!

Prolonging the internal source of the instrument's power can be achieved by reducing the brightness of the screen when possible. The settings of **Brightness** and power saver function may be done in the **Screen Setup** window (path: <Menu> / Display / Screen Setup).

### 3.3. Initial Setup of the instrument

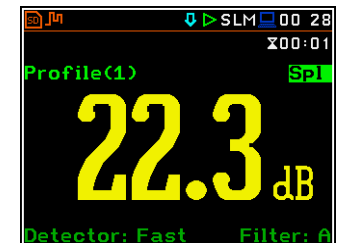
#### Switching the instrument on

To switch the power on the user should press the <Alt> and <Start/Stop> push-buttons at the same time. The instrument goes through the self-test routine after switching on (displaying the manufacturer and the name of the instrument) and then it enters the sound mode. The default display mode for result presentation is one profile.

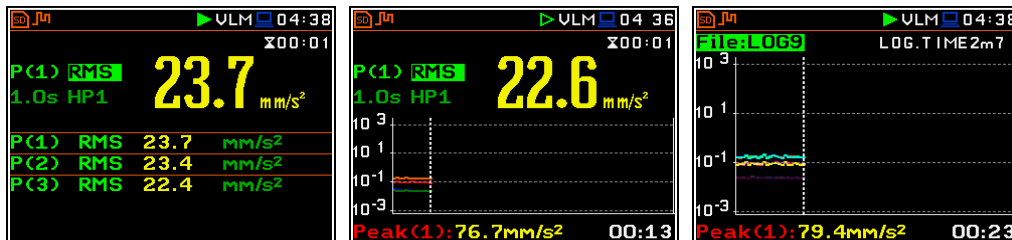


#### Starting measurement

To start the measurements the user has to press the <Start/Stop> push-button. The result of the measurement is displayed with the unit of the measurement in so-called one profile mode.

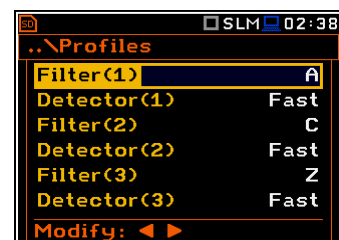


One profile mode is always available for most Functions of the instrument. The results of the measurements can also be presented in combined mode. In this mode the screen is divided into two parts and the results for one profile and three profiles can be presented together, as well as for one profile and logger and for three profiles and logger.



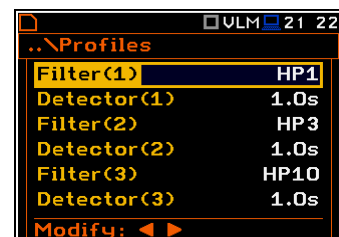
#### Default profile settings for Sound measurements:

- Profile 1** - A weighting filter (**Filter(1)=A**), **Fast** for the RMS detector (**Detector(1)=Fast**), the results of the measurements are not stored in the logger's file;
- Profile 2** - C weighting filter (**Filter(2)=C**), **Fast** for the RMS detector (**Detector(2)=Fast**), the results of the measurements are not stored in the logger's file;
- Profile 3** - Z weighting filter (**Filter(3)=Z**), **Fast** for the detector (**Detector(3)=Fast**), the results of the measurements are not stored in the logger's file.



#### Default profile settings for Vibration measurements:

- Profile 1** - HP1 weighting filter (**Filter(1)=HP1**); **1.0s** for the RMS detector (**Detector(1)=1.0s**), the results of the measurements are not stored in the logger's file;
- Profile 2** - HP3 weighting filter (**Filter(2)=HP3**), **1.0s** for the RMS detector (**Detector(2)=1.0s**), the results of the measurements are not stored in the logger's file;



**Profile 3** - **HP10** weighting filter (**Filter(3)=HP10**), **1.0s** for the RMS detector (**Detector(3)=1.0s**), the results of the measurements are not stored in the logger's file.

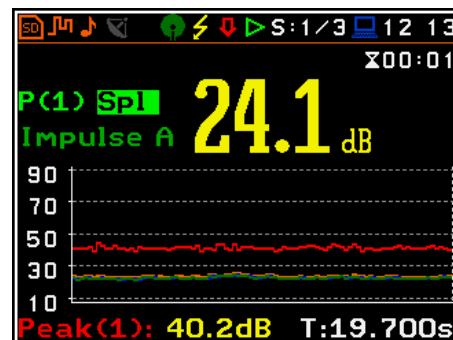
The user can change all the above mentioned settings using **Profiles** sub-list of the **Measurement** list. The instrument remembers all changes for the next time it is used. Return to the default settings (set up by the manufacturer) is possible after the selection of the **Factory Settings** position available in the **Auxiliary Setup** list.

### 3.4. Description of icons


#### Description of the instrument state









Additional information about the instrument's state is given by means of the row of icons visible in the top of the display.

The type of measurement function and the measurement mode (SLM, VLM, S:1/3 etc.) as well as real time clock (RTC) is also displayed in the same line together with icons.



The meanings of the icons are as follows:

	“play” icon is displayed when the measurement is started.		“plug” icon is displayed when the instrument is powered from the external source.
	“stop” icon is displayed when the measurement is stopped.		“Internal memory” icon is displayed when internal memory is assigned for file saving.
	“pause” icon is displayed when the measurement is paused.		“SD Card” icon is displayed when external micro SD card memory is assigned for file saving. Micro SD card is inserted.
	“antenna” icon is displayed when the wireless transmission is active (GPRS or Modbus is active).		“RS232” icon is displayed when the RS232 port is activated.
	“computer” icon is displayed when there is a successful USB connection with the PC.		“vibration” icon is displayed when self vibration level is exceeded.
	“curve” icon is presented when the current measurement results are logged in the instrument's logger file.		“lightning” icon is displayed when polarisation voltage is 200V.
	“arrow up” icon is displayed when overload appears.		“Trigger Level +” icon is displayed when the trigger condition is set up to „Level+”. The icon appears alternately with the „play” icon.
	“arrow down” icon is displayed when under range appears.		“Trigger Level -” icon is displayed when the trigger condition is set up to „Level-”.
	“USB Disk” icon is displayed when USB disc is assigned for file saving. USB disc is connected and activated.		“Trigger Slope +” icon is displayed when the trigger condition is set up to „Slope+”.
	“tone” icon is displayed during wave recording and event recording.		“Trigger Slope -” icon is displayed when the trigger condition is set up to „Slope-”.

	"windscreen" icon is displayed when windscreen is applied.		"Alt" icon is displayed when the <Alt> push-button is pressed.
	"cable" icon is displayed when the microphone is connected via extension cable.		"Shift" icon is displayed when the <Shift> push-button is pressed.
	"clock" icon is displayed when the timer is On. Is active when the instrument is waiting for the measurement start up to occur. When the measurement start up is close, the icon changes its colour to green and starts to blink.		"battery" icon is displayed when the instrument is powered from the internal batteries. Icon corresponds to the status of the batteries (three, two, one or none vertical bars inside the icon). When voltage of batteries is too low, the icon becomes red.
	"satellite" icon is displayed when GPS is active. Colours of the icon define the state of the GPS: green – active, blue – searching, grey – disconnected.		"Bluetooth" icon is displayed when the Bluetooth is switched on. Colours of the icon define the state of the Bluetooth: blue – connected, grey – disconnected.

### 3.5. Memory organisation

#### Memory options

All available measurement results can be stored in the internal FLASH type memory of the instrument (32 MB) or in the external Memory (micro **SD Card** or **USB Disk**). Device settings are kept only in the internal memory. Logger, wave and event results can be stored only in the external Memory.

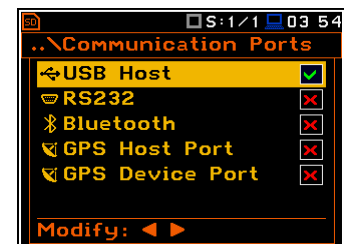
The **SD Card** external memory is activated automatically after insertion of the card. The activation of the **USB Disk** is needed and is performed in the **Communication Ports** window of the **Instrument** menu.

The **File Manager** is used for checking the contents of the memory and for operating on result and logger files and catalogues such as: open, delete, copy, move, rename, create new files or catalogues and display file and catalogue information.

Activation of the **USB Disk** can also be performed in the **File Manager** window. The user should select the **USB Disk** position and press the <ENTER> push-button. Then in the Command list select the **Activate USB Host** position and press the <ENTER> push-button again.

The **SD Card** and **USB Disk** memory is organised as standard memory with directories and sub-directories. It is possible to create and to delete the directory structure.

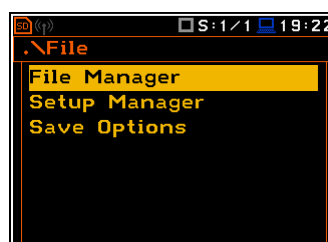
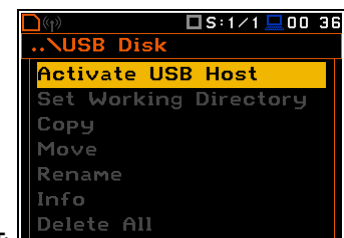
The content of each memory file type can be checked with the help of the **File Manager** or **Setup Manager** function of the **File** menu.



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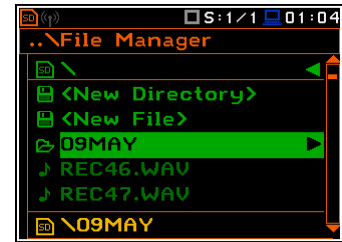


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The files are saved in the Memory and in the catalogue, which was set up as the working catalogue. The working directory is displayed in the bottom line of the **File Manager** window. The working Memory type is displayed as the icon in the left position of the icon line.

The user can copy or move data from the internal memory of the device and store new data in the external memory.



“**USB Disk**” icon is displayed when USB disc is assigned for file saving. USB disc is connected and activated.



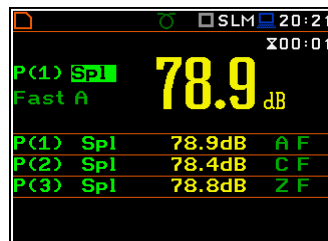
“**Internal**” memory icon is displayed when internal memory is assigned for file saving.



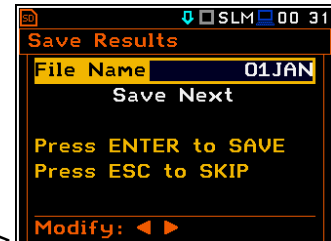
“**SD Card**” icon is displayed when external SD card memory is assigned for file saving. Micro SD card is connected.

There are two options for storing result data in the internal or external memory. One option is to press **<Save>** push-button right after the measurement finishes. Another option is to create **<New File>** in the **File Manager**.

After pressing the **<Save>** push-button the **Save Results** window appears. In the **Save Results** window the user can enter a name for the result file or choose automatic name generation option.



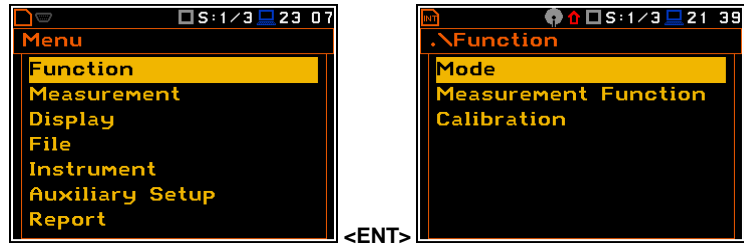
<Save>



The measurement configuration Setup files can be stored also by means of **<S/P>** push-button and by creating the **<New File>** in the **Setup Manager** list. The logger, wave and event files are created automatically in the assigned directory on the external memory driver.

## 4. FUNCTIONS OF THE INSTRUMENT – Function

In order to select the **Function** list the user has to press the **<Menu>** push-button, select the **Function** text and press **<ENTER>**. The **Function** list contains three elements: **Mode**, **Measurement Function** and **Calibration**.

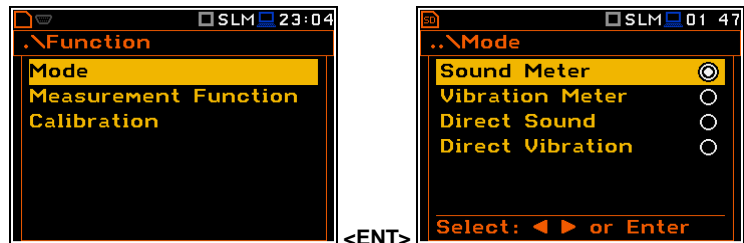


The **Function** list consists of:

- Mode** enables the user to select the sound or vibration mode of the instrument;
- Measurement Function** enables the user to select the measurement function of the instrument;
- Calibration** enables the user to perform a calibration of instrument's measurement channel.

### 4.1. Selecting the mode of the instrument – Mode

The device can work in four modes – two sound modes: **Sound Meter** and **Direct Sound**; and two vibration modes: **Vibration Meter** and **Direct Vibration**.



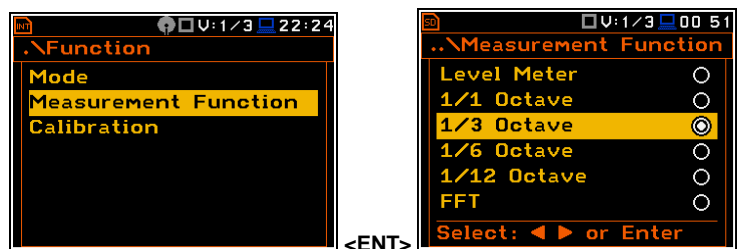
**Notice:** In the user manual text the Sound mode (or Sound measurements) refers to the **Sound Meter** and **Direct Sound** modes and the appropriate functions dedicated for the measurement and analysis of the acoustic signal: **Level Meter**, **1/1 Octave**, **1/3 Octave**, **FFT**; the Vibration mode (or Vibration measurements) refers to the **Vibration Meter** and **Direct Vibration** modes and the appropriate functions dedicated for the measurement and analysis of the vibration signal: **Level Meter**, **1/1 Octave**, **1/3 Octave**, **FFT**.

### 4.2. Measurement functions of the instrument – Measurement Function

The main function of the instrument is the measurement of Sound pressure or Vibration broad band level (**Level Meter**). The Sound Level Meter (SLM) function provides the user with functions meeting the standard IEC 61672:2002 for Type 1 accuracy and the Vibration Level Meter (VLM) meeting the standard ISO 8041:2005. The instrument can also be used for medium to the long-term acoustic monitoring using the huge capacity data logger in which all the measurement results are stored.

The user may also use 1/1, 1/3, 1/6 and 1/12 real time octave band frequency analysis functions. These functions extend the main broad band Level Meter functions of the instrument, because the selected 1/1 - 1/12 octave analysis is performed together with all calculations of the Level Meter functions.

In order to select the required function the user has to enter the **Measurement Function** list. After entering the **Measurement Function** list, the set of the available functions appears on the display: **Level Meter**, **1/1 Octave**, **1/3 Octave**, **1/6 Octave**, **1/12 Octave** and **FFT** (in case of Vibration modes) and also **RT60** and **Tonality** (in case of Sound modes). The currently active function is marked.



**Notice:** The type of measurement function and the measurement mode is displayed in the upper line of the screen.



- <b>SLM</b>	<b>Sound Level Meter,</b>	- <b>VLM</b>	<b>Vibration Level Meter,</b>
- <b>S: 1/1</b>	<b>Sound 1/1 Octave,</b>	- <b>V: 1/1</b>	<b>Vibration 1/1 Octave,</b>
- <b>S: 1/3</b>	<b>Sound 1/3 Octave,</b>	- <b>V: 1/3</b>	<b>Vibration 1/3 Octave,</b>
- <b>S: 1/6</b>	<b>Sound 1/6 Octave,</b>	- <b>V: 1/6</b>	<b>Vibration 1/6 Octave,</b>
- <b>S: 1/12</b>	<b>Sound 1/12 Octave,</b>	- <b>V: 1/12</b>	<b>Vibration 1/12 Octave,</b>
- <b>S: FFT</b>	<b>Sound FFT,</b>	- <b>V: FFT</b>	<b>Vibration FFT,</b>
- <b>DSL M</b>	<b>Direct Sound Level Meter,</b>	- <b>DVLM</b>	<b>Direct Vibration Level Meter,</b>
- <b>DS: 1/1</b>	<b>Direct Sound 1/1 Octave,</b>	- <b>DV: 1/1</b>	<b>Direct Vibration 1/1 Octave,</b>
- <b>DS: 1/3</b>	<b>Direct Sound 1/3 Octave,</b>	- <b>DV: 1/3</b>	<b>Direct Vibration 1/3 Octave,</b>
- <b>DS: 1/6</b>	<b>Direct Sound 1/6 Octave,</b>	- <b>DV: 1/6</b>	<b>Direct Vibration 1/6 Octave,</b>
- <b>DS: 1/12</b>	<b>Direct Sound 1/12 Octave,</b>	- <b>DV: 1/12</b>	<b>Direct Vibration 1/12 Octave,</b>
- <b>DS: FFT</b>	<b>Direct Sound FFT,</b>	- <b>DV: FFT</b>	<b>Direct Vibration FFT.</b>
- <b>S: RT60</b>	<b>Sound RT60,</b>		
- <b>S: TON.</b>	<b>Sound Tonality,</b>		

Optional measurement functions that broaden the applications of the instrument can be easily installed. These options can be initially supplied by the manufacturer or purchased later and added by the user.

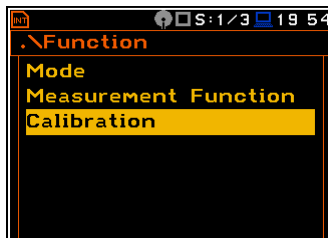


**Notice:** It is not possible to change the measurement function during a measurement run. In this case the instrument displays for about 3 seconds the message: **“Measurement in Progress”**. In order to change the mode of the instrument the current measurement in progress must be finished!

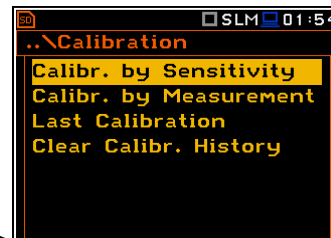
### 4.3. Instrument's calibration – Calibration

The instrument is factory calibrated with the supplied microphone for the standard environmental conditions. Because the microphone sensitivity is a function of the temperature, ambient pressure and humidity, when the absolute sound pressure level value is important, the absolute calibration of the measurement channel should be performed. In order to select the calibration function the user has to enter the **Calibration** sub-list.

The **Calibration** sub-list consists of four positions: **Calibr. By Sensitivity**, **Calibr. By Measurement**, which are used to perform the actual calibration, **Last Calibration**, which contains the list of calibration measurements performed earlier and the results obtained and finally **Clear Calibr. History**.



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**Notice:** The calibration factor is always added to the results in the **Level Meter**, **1/1 Octave**, **1/3 Octave**, **FFT** and other modes.



**Notice:** It is advised to perform the calibration of the instrument each time before the measurements begin. A single calibration at the start of each day is usually sufficient for most regulations.



**Notice:** The calibration level and the calibration result are expressed in different units depending on the settings of the instrument. The metric or non-metric Vibration units are set in the **Vibration Units** window (path: <Menu> / Auxiliary Setup / Vibration Units). Additionally, the linear or logarithmic units are set in the **Display Scale** window (path: <Menu> / Display / Display Scale).



**Notice:** It is not possible to calibrate the instrument during the execution of live measurements. It is possible to open different lists and sub-lists but the positions in these lists are displayed greyed out inversely and so – not accessible. The flashing “▶” icon on the top line indicates that the instrument is in the measurement process. In order to change the sensitivity the current measurement in progress must be finished!

#### 4.3.1. Calibration by Sensitivity in case of Acoustic signal

Calibration by introducing the microphone's sensitivity can be performed in the following way:

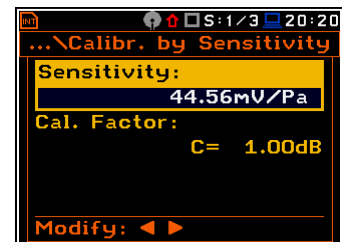
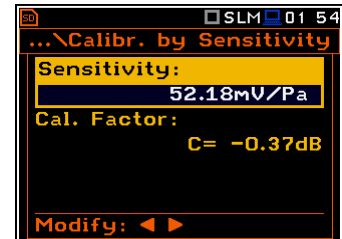
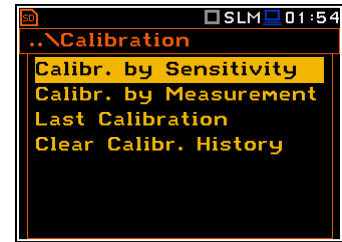
1. Select this type of the calibration (highlight the **Calibr. by Sensitivity** text) from the **Calibration** sub-list and press the **<ENTER>** push-button.
2. Set the sensitivity of the microphone taken from its calibration certificate using the **<Shift>** with **<↑>**, **<↓>** push-buttons and then press **<ENTER>**.

The calibration factor is calculated, after pressing the **<ENTER>** push-button, in relation to the nominal value of 50.0 mV / Pa. In order to exit the calculation the user has to leave the **Calibration** sub-list by pressing **<ESC>**. For a microphone sensitivity higher than 50.0 mV / Pa the calibration factor will always be negative.

For a microphone sensitivity lower than 50.0 mV / Pa the calibration factor will always be positive.

The lowest available value of the sensitivity that can be introduced is equal to 50.0  $\mu$ V / Pa (it conforms to the calibration factor equal to 60.0 dB) and the highest value is equal to 50.0 V / Pa (calibration factor is equal to -60.0 dB).

In order to return to the **Calibration** sub-list the user has to press the **<ESC>** push-button.



#### 4.3.2. Calibration by Sensitivity in case of Vibration signal

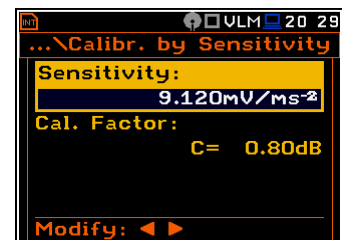
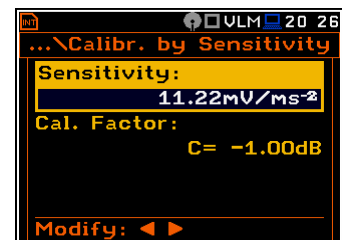
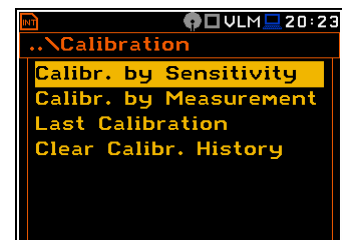
Calibration by using the accelerometer's published sensitivity information can be performed in the following way:

1. Select this type of calibration (highlight the **Calibr. by Sensitivity** text) from the **Calibration** sub-list and press the **<ENTER>** push-button.
2. Set the sensitivity of the accelerometer taken from its calibration certificate using the **<Shift>** with **<↑>**, **<↓>** push-buttons and then press **<ENTER>**.

The calibration factor is calculated, after pressing the **<ENTER>** push-button, in relation to the nominal value of 10.0 mV / ms<sup>-2</sup>. In order to exit the calculation the user has to leave the **Calibration** sub-list by pressing **<ESC>**. For an accelerometer sensitivity higher than 10.0 mV / ms<sup>-2</sup> the calibration factor will always be negative.

For an accelerometer sensitivity lower than 10.0 mV / ms<sup>-2</sup> the calibration factor will always be positive.

The lowest available applicable value of the sensitivity that can be introduced is equal to 10.0  $\mu$ V / ms<sup>-2</sup> (it conforms to the calibration factor equal to 60.0 dB) and the highest value is equal to 10.0 V / ms<sup>-2</sup> (calibration factor is equal to -60.0 dB).



#### 4.3.3. Calibration By Measurement in case of acoustic signal



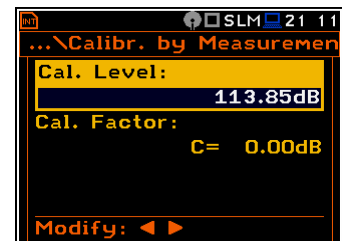
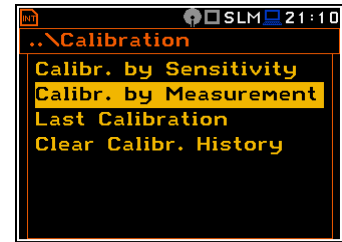
Calibration by measurement for the sound measurements can be done in the following way:

1. Select the calibration by measurement (highlight the **Calibr. by Measurement** text) from the **Calibration** sub-list and press the **<ENTER>** push-button.
2. Attach the acoustic calibrator SV 30A (or equivalent **114 dB / 1000 Hz**) carefully over the microphone of the instrument.

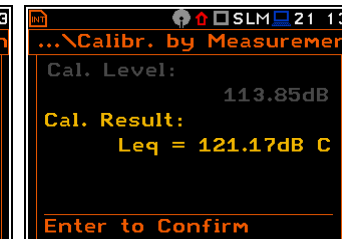
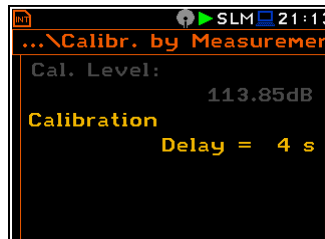


**Notice:** It is also possible to use an electro-mechanical pistonphone, which generates the signal ca 124 dB or different type of acoustic calibrator dedicated for ½" microphones. In any case, before starting the calibration measurement, the user has to set the level of the signal generated by the given calibrator (**Cal. Level** position of **Calibr. by Measurement** sub-list), which is stated in the calibration certificate of the unit (the value of the **Cal. Level** set by the manufacturer of SVAN 979 is equal to 114 dB). It is also necessary to switch the instrument **Range** to the **High** level setting.

3. Switch on the calibrator and wait approximately 30 seconds for the tone to stabilise before starting the calibration measurement.
4. Start the calibration measurement by pressing the **<Start/Stop>** push-button.



The calibration measurement time is set to 3 seconds with 3 seconds delay. During the calibration measurement the **<ESC>** and **<Pause>** push-buttons do not operate but it is possible to stop the measurement using the **<Start/Stop>** push-button. It is not recommended to stop the calibration measurement before the pre-programmed 5 seconds period! Waiting for the start of the measurements the **Delay** is counted down on the display. After the end of the measurement, the result is displayed in the bottom line.



It is recommended to repeat the calibration measurement a few times to ensure the integrity and stability of the calibration. The obtained results should be almost identical (with  $\pm 0.1$  dB difference). Some possible reasons for unstable results are as follows:

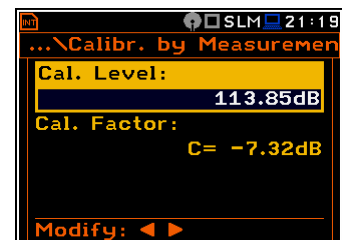
- the calibrator is not properly attached to the instrument,
- there are external acoustic disturbances such as high noise levels close by,
- the calibrator or the measurement channel (the microphone, the preamplifier or the instrument itself) are damaged.



**Notice:** During the calibration measurement, any external disturbances (acoustic noise or vibrations) should not exceed a value of 100 dB (when using a calibrator that generates a level of 114 dB).

5. Press the **<ENTER>** push-button to accept the calibration measurement result.

The calibration factor is calculated, stored and displayed (cf. next Figure to the right) after pressing the **<ENTER>** push-button.



**Notice:** The user can press the **<ESC>** push-button to quit the calibration procedure without saving the calibration factor.

#### 4.3.4. Calibration By Measurement in case of vibration signal

Calibration by measurement for the vibration measurements can be done in the following way:

1. Select the calibration by measurement (highlight the **Calibr. by Measurement** text) from the **Calibration** sub-list and press the **<ENTER>** push-button.
2. Attach the instrument's accelerometer to the vibration calibrator using an appropriate or recommended fixing method.
3. Switch on the calibrator and wait approximately 30 seconds before starting the calibration measurement. The default level for calibration in the vibration mode is 10 m/s<sup>2</sup> at 159.2 Hz. Remember to change this level if using an alternative vibration calibration signal source.
4. Start the calibration measurement by pressing the **<Start/Stop>** push-button.

The calibration measurement starts after 3 seconds delay. The measurement time is also predefined to 3 seconds. During the calibration period, the **<ESC>** and **<Pause>** push-buttons do not operate but it is possible to stop the measurement using the **<Start/Stop>** push-button. It is not recommended to stop the calibration measurement before the pre-programmed 3 seconds period! Waiting for the calibration measurement the **Delay** is counted down on the display. After the end of the measurement, the result is displayed in the bottom line.

It is recommended to repeat the calibration measurement a few times to ensure the integrity and stability of the calibration. The obtained results should be almost identical (with  $\pm 0.1$  dB difference). Some possible reasons for unstable results are as follows:

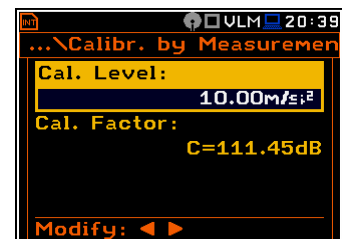
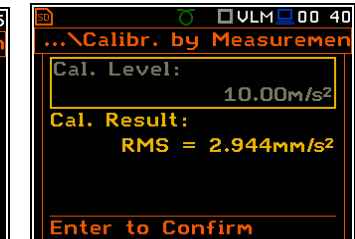
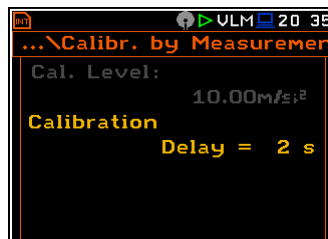
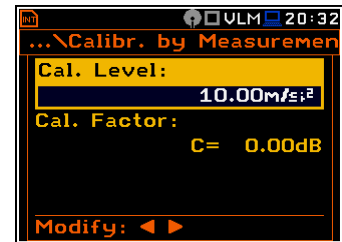
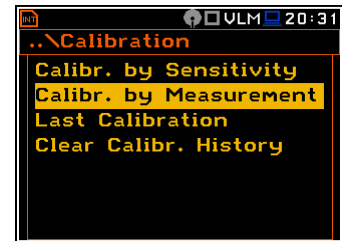
- the accelerometer is not properly attached to the calibrator,
- there are external disturbances,
- the calibrator or the measurement channel (the accelerometer or the instrument itself) are damaged.



**Notice:** During the calibration measurement, the external disturbances (vibrations or acoustic noise) should not exceed a value of 1/10 of the level of the calibration level signal being used dB.

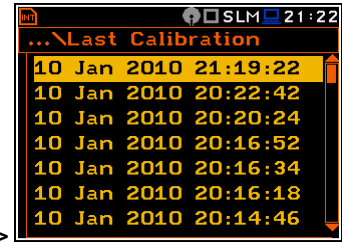
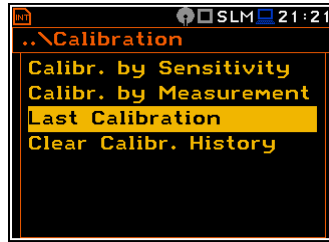
5. Press **<ENTER>** in order to accept the measurement result.

The calibration factor is calculated, stored and displayed after pressing the **<ENTER>** push-button.



#### 4.3.5. History of the calibrations - Last Calibration

The **Last Calibration** window displays records from up to the ten last calibration records.

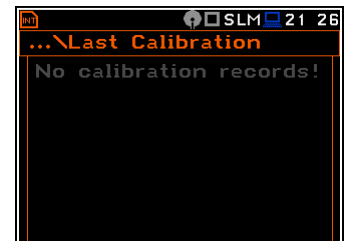


<ENT>

In order to review the calibration records, the user has to select the required line in the **Last Calibration** window and press <ENTER>. The opened window will contain the date and time of the performed calibration measurement, the way the calibration was done (**Calibr. by Measurement** or **Calibr. by Sensitivity**), the desired calibration level (**Cal. Level**) in the case of the measurements and the obtained calibration factor (**Cal. Factor**).



If calibration measurements were not performed, the **Last Calibration** window does not contain any previous calibration records. The content of this window is cleared after selection of the default **Factory Settings** operation.

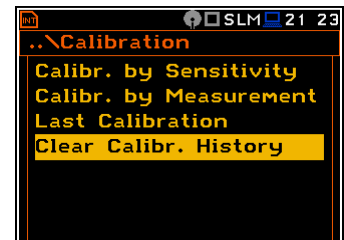


#### 4.3.6. Clear calibration records - Clear Calibr. History

The user can clear all stored calibrations records. In order to do this the user has to choose the position **Clear Calibr. History** in the **Calibration** sub-list and press <ENTER> to perform this operation.

The instrument requests the confirmation of the operation. The next pressing of the <ENTER> push-button, when the **No** option is selected, closes the window and returns the instrument to the **Calibration** sub-list.

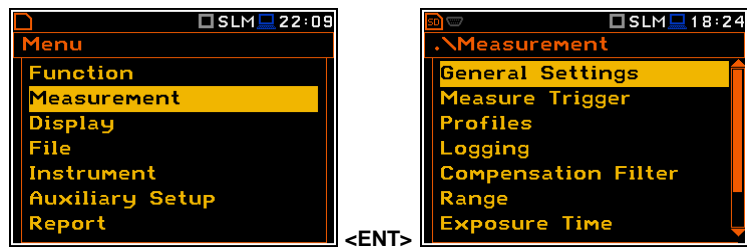
After **Clear Calibr. History** operation has been performed the **Calibration History** window does not contain any more records.



**Notice:** Both acoustic and vibration calibration histories are stored in the same memory so clearing the calibration history when in the vibration mode will also clear all acoustic calibration history information as well.

## 5. MEASUREMENT PARAMETERS SETTING – Measurement

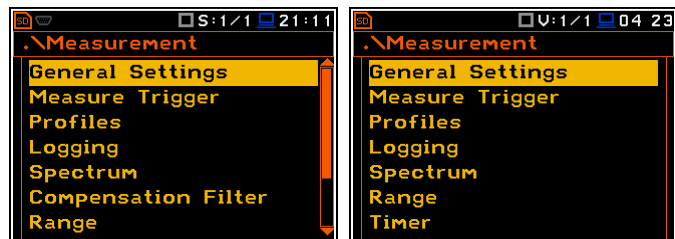
The **Measurement** list contains the elements that enable the user to set the measurement parameters. To open the **Measurement** list the user has to press the **<Menu>** push-button, select the **Measurement** text and press **<ENTER>**.



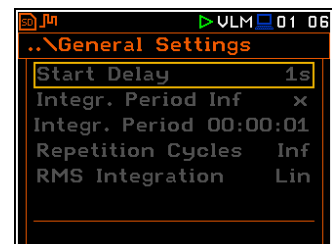
The **Measurement** list contains the following items:

<b>General Settings</b>	enables the user to set various general measurement parameters;
<b>Measure Trigger</b>	enables the user to set up the measurement trigger;
<b>Profiles</b>	enables the user to program the profile configuration parameters;
<b>Logging</b>	enables the user to program the time history logging function;
<b>Spectrum</b>	enables the user to set spectrum analysis parameters;
<b>Compensation Filter</b>	enables the user to switch on required microphone compensation filter;
<b>Range</b>	enables the user to set the correct measurement range;
<b>Exposure Time</b>	enables the user to set the daily exposure time for dose results;
<b>Statistical Levels</b>	enables the user to define 10 statistical LN% levels;
<b>Timer</b>	enables the user to program the internal delay start/stop timer.

The content of the **Measurement** list is different for different **Mode** and **Measurement Function** and other settings. The **Measurement** lists for **Direct Sound** and **Direct Vibration** modes are identical to **Sound Meter** and **Vibration Meter** modes accordingly. Some examples for different modes and measurement functions are presented.

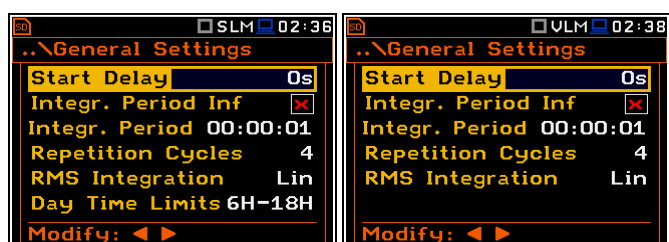


Any parameter in the **Measurement** list can be changed only when the instrument is not currently executing a measurement. The parameters are displayed with grey colour. The blinking "►" icon on the top row indicates that the instrument is performing a measurement.



### 5.1 Selection of measurement parameters - General Settings

The **General Settings** list consists of the following parameters: the delay of the start of measurements (**Start Delay**), the integration period / measurement run time (**Integration Period**), the repetition of the measurement cycles (**Repetition Cycles**), the RMS detector type (**RMS Integration**) and the intervals for day time period (**Day Time Limits**) in



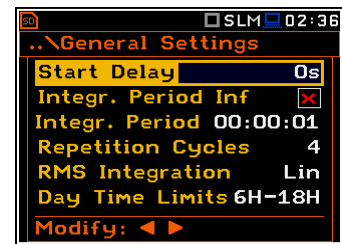
case of Sound modes.

### Setting time delay before the start of measurements

The **Start Delay** position defines the delay period from the moment the **<Start/Stop>** push-button is pressed to the start of the actual measurements (the digital filters of the instrument constantly analyse the input signal even when the measurement is stopped). This delay period can be set from **0 second** to **60 seconds** (with 1 second step by means of the **<1>**, **<2>** push-buttons and with 10 seconds step by means of the **<1>**, **<2>** push-buttons pressed together with **<Shift>**).

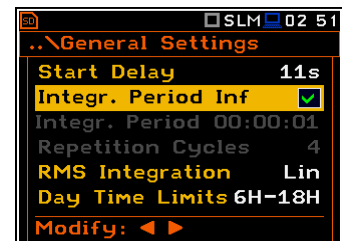


**Notice:** The minimum delay period is equal to 0 second. In the **Calibration** mode, the delay period is always equal to 3 seconds.



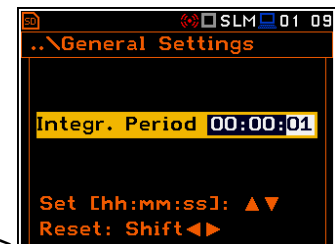
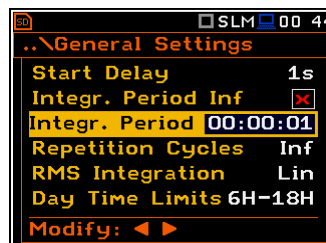
### Switching on/off the integration period settings

The integration period can be set as infinite or can be defined together with the **Repetition Cycles** number. The **Integr. Period Inf** position defines if the period during which the signal is being measured is infinite or not. If the **Integr. Period Inf** parameter is switched on then the signal will be averaged all the time until the **<Stop>** push-button is pressed and the measurement is stopped (1 continuous cumulative result). If integration period is infinite, then two next positions become inactive.



### Setting the integration period

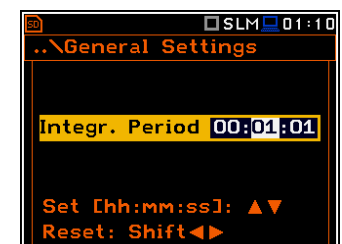
The **Integr. Period** position (integration period) defines the period during which the signal is being measured (integrated). The integration period can be set in the special window, which is opening by pressing the **<1>** or **<2>** push- buttons.



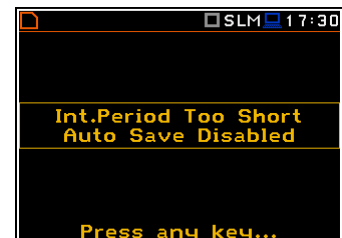
The measurement will stop automatically after this period, or the measurement will start again when the selected **Repetition Cycle** is greater than 1 (one). The definitions of the measurement results in which the integration period is used is given in App. D.

To set the integration period the user should define the required hours, minutes and seconds field.

- The appropriate field may be selected by pressing the **<1>** or **<2>** push- buttons.
- Value of hour, minute and second is changed by means of the **<^>** or **<v>** push- buttons.



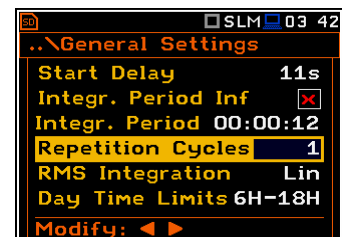
If the user uses the **Auto Save** option (path: **<Menu>** / **File** / **Save Options** / **Auto Save**) the integration period value has to be greater or equal than 10 seconds. When the **Auto Save** option was switched on and new entered integration period value is less than 10 seconds **Auto Save** option switches off and the **Int. Period Too Short / Auto Save Disabled** message appears on the display.



### Setting the repetition number of measurement cycles

The **Repetition Cycles** position defines the number of cycles (with the measurement period defined by **Integration Period**) to be performed by the instrument. The **Repetition Cycles** number values are within the limits [1, 1000].

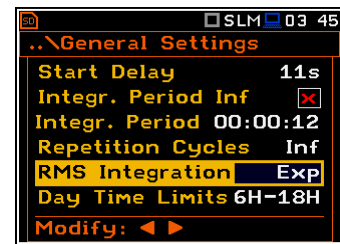
The **Integration Period** setting can be considered to be equivalent to setting the Summary Results in some other instruments where all the results are saved at the interval period selected by the user, in addition to



the time history logger results, enabling dual interval data logging to occur.

### Detector's type selection

The **RMS Integration** position defines the detector type for the calculations of the **Leq**, **Lden**, **LEPd**, **LN%** and **Sel** functions. Two options are available: linear (**Lin**) and exponential (**Exp**). The formulae used for the **Leq** calculation are given in Appendix D.

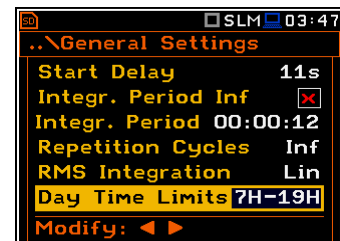


Selecting **Lin** is required to obtain the true RMS value of the measured signal. When this option is selected the value of the **Leq**, **Lden**, **LEPd**, **LN%** and **Sel** functions do not depend on the detector time constant: **Fast**, **Slow** or **Impulse** (the results are displayed without the indicator of the detectors selected in the profiles). In this case, the indicator **Lin.** (or **L**) is displayed in the different modes of the result presentation.

Selecting **Exp** enables the user to fulfil the requirements of another standard for the time averaged **Leq** measurements. When this option is selected the value of the **Leq**, **Lden**, **LEPd**, **LN%** and **Sel** function depends on the detector time constant (**Slow**, **Fast**, **Impulse**). The results are displayed with the indicator of the detectors selected in the profiles (path: <Menu> / Measurement / Profiles).

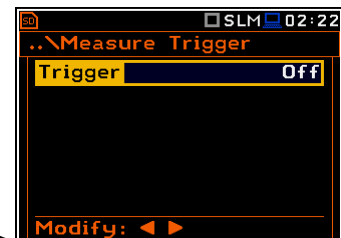
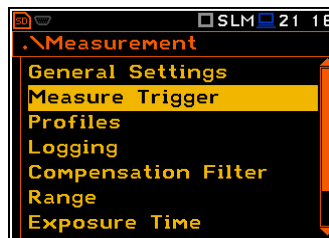
### Day time limits selection

The **Day Time Limits** position enables the user to select the definition of the day and night periods required by the local standards. These limits are used for the calculation of the **Lden** function (cf. App. D for the definition). Two options are available: **6H-18H** and **7H-19H**.



## 5.2 Measure trigger parameters selection – Measure Trigger

The **Measure Trigger** sub-list enables the user to set the parameters for the measure trigger. The **Measure Trigger** is a context sub-list in which the triggering can be switched off or on (**Trigger**), when the source of the triggering signal can be determined (**Source**), using its level (**Level**) and sometimes also the speed of changes (**Gradient**). Triggering of the measurement (**Trigger**) can be switched off using the <↑> push-buttons.



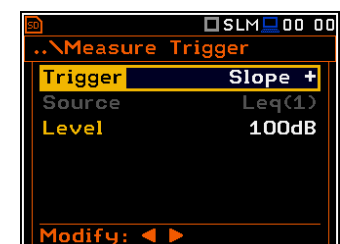
Triggering is switched on if one of its six available modes is selected: **Slope +**, **Slope -**, **Level +**, **Level -**, **Grad +** or **External**. If the instrument works with the triggering switched on, the appropriate icon appears on the display when the triggering condition is not fulfilled.

The triggering condition is checked every 0.5 milliseconds. This parameter (**Trigger period**) is constant and is displayed inversely.

### Slope type trigger



When **Slope +** is selected, the measurement starts when the rising result value (**Source**) passes above the level determined by the selected decibel **Level**. When **Slope -** is selected, the measurement starts when the falling result value (**Source**) passes below the level determined by the selected decibel **Level**. The measurement is stopped when the conditions set in the **General Settings** sub-list are fulfilled or after pressing the <Start/Stop> push-button or after receiving the proper control code remotely.





### Level type trigger



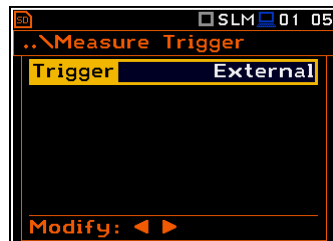
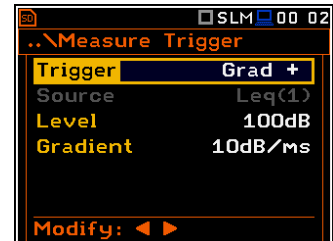
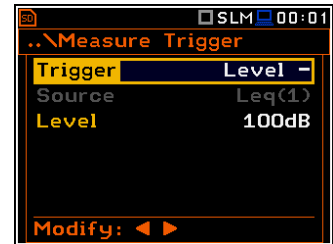
When **Level +** or **Level -** is selected for the measurement the triggering condition is checked every 0.5 millisecond. The measurement is recorded only when the result value (**Source**) has the greater/ lower level than that determined in the **Level** position otherwise the measurement result is skipped.

### Gradient type trigger

When **Grad +** is selected the triggering condition is checked every 0.5 millisecond of the measurement. The measurement is recorded only when the result value (**Source**) has a greater level than that determined by the selected decibel **Level** and the gradient of the signal is greater than determined in the **Gradient** position. Otherwise the measurement result is skipped.

### External type trigger

When **External** is selected the triggering is done by the signal on the **I/O** socket. In this case it is necessary to set up the **I/O Mode** parameter as **Digital In** (path: <Menu> / Instrument / Multifunction I/O). In the other case the measurement result is skipped.

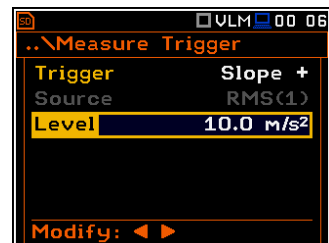
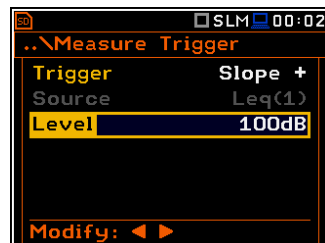


### Selection of the triggering signal

It is assumed that only one measured result can be used as a source of the triggering signal in the **Level Meter** mode, namely the output signal from the RMS detector coming from the first profile which is denoted here as **Leq(1)**. This position does not become active (it is not displayed inversely) and the text stated here remains unchanged. After pressing there the <▼> push-button, the **Source** line is skipped.

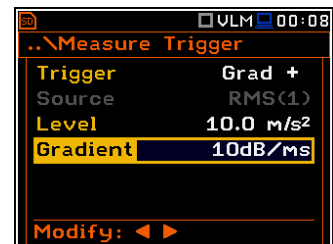
### Setting the level of the triggering signal

The level of the triggering signal (**Level**) can be set in 1 dB step (or 10 dB steps) from 24 dB to 136 dB range. The **Level** value of the triggering signal refers to the instantaneous value of the RMS result from the first profile calculated during the period depending on selected **Detector** (path: <Menu> / Measurement / Profiles ).



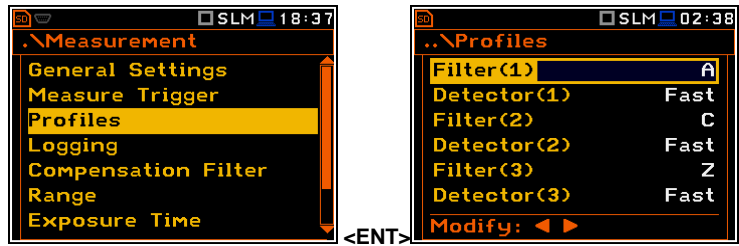
### Setting the speed of the triggering signal changes

This position appears when the **Grad+** trigger is chosen. The speed of change of the triggering signal (**Gradient**) can be set within the range from 1 dB/ms to 100 dB/ms.



## 5.3 Setting parameters in a profile – Profiles

In the **Profiles** sub-list the following parameters can be programmed independently for each user defined profile: weighting filter (**Filter**) and RMS detector type (**Detector**).



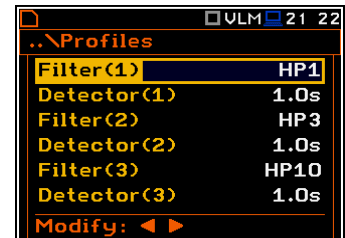
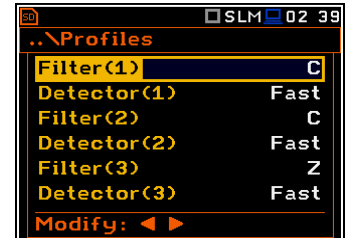
### Weighting filter selection

#### Sound measurements

- **Z** type 1 according to IEC 61672-1 standard,
- **A** type 1 according to IEC 651 and IEC 61672-1 standards,
- **C** type 1 according to IEC 651 and IEC 61672-1 standards,
- **B** type 1 according to IEC 651 standard,
- **G** according to ISO 7196:1995 standard.
- **R1, R2, R3** if the **Real Time Filters** are activated in the **Setup** list (path: <Menu> / Auxiliary Setup / User Filters / Real Time Filters)

#### Vibration measurements

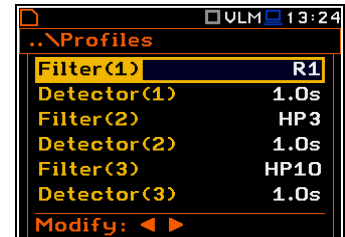
- acceleration measurements: **Z, HP1, HP3, HP10, Wh,**
- velocity measurements: **Vel1, Vel3, Vel10 and VelMF,**
- displacement measurements: **Dil1, Dil3 and Dil10.**



For all types of signal it is possible to use real time filters **R1, R2, R3** if they are activated in the **Setup** list (path: <Menu> / Setup / User Filters / Real Time Filters)

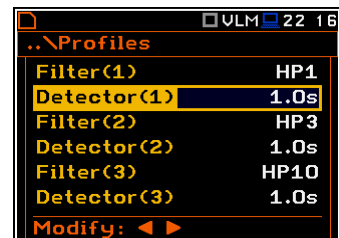
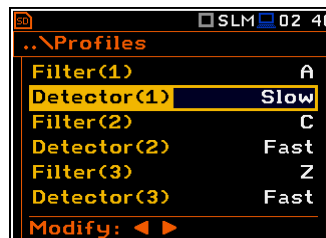
The characteristics of the filters are given in App. D.

(The **Real Time Filters** for the SVAN 979 are an extra cost option, part number SV 979-16)



### RMS detector selection

The following RMS detectors are available in the instrument: **Impulse, Fast** and **Slow** (in the case of Sound measurements) and **100ms, 125ms, 200ms, 500ms, 1.0s, 2.0s, 5.0s, 10.0s** (in the case of Vibration measurements).



## 5.4 Setting the data logging functionality – Logging

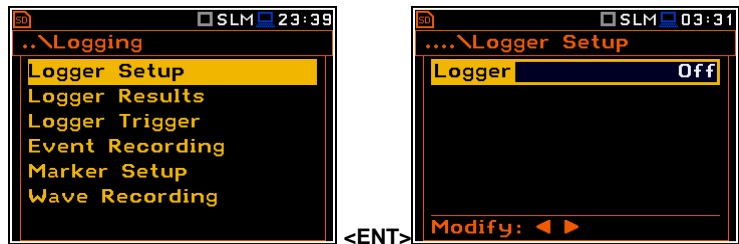
The **Logging** list enables the user to program the logger functions: the recording of the measurement time history results (TH) and program the markers and parameters of the event or signal (wave) recording. The **Logging** list consists of six positions: **Logger Setup, Logger Results, Logger Trigger, Event Recording, Marker Setup** and **Wave Recording**.



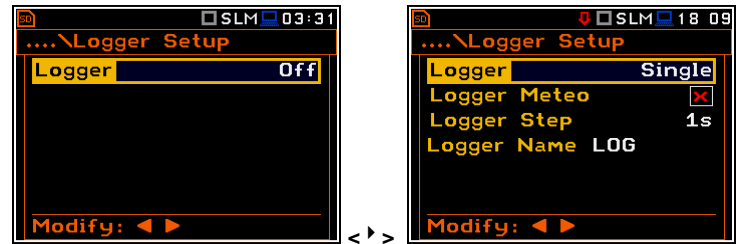


### 5.4.1 Data logger programming – Logger Setup

The **Logger Setup** list enables the user to activate logger functionality and meteo results logging. It also allows the user to edit the name of the logger file and to set the logger interval step.

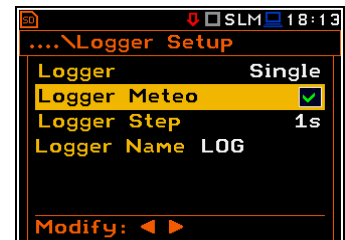


The **Logger** position switches on and off the functionality, which enables the user to save selected results from the three user profiles with the defined period interval selected in **Logger Step**.



The **Logger Meteo** switches on (☒) or off (☐) the recording of the meteorological results from the SV 205 Weather Monitoring Station.

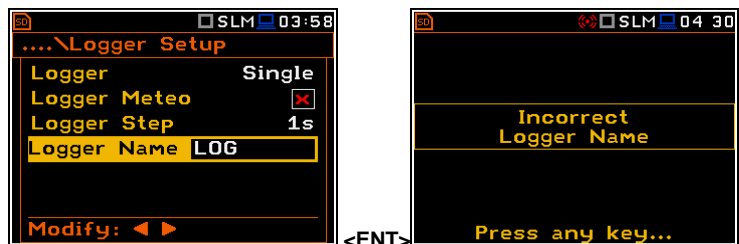
The **Logger Step** defines the period of the data logging in a file. It can be set from 2 milliseconds to 1 second in 1, 2, 5 sequences, the values from 1 second to 59 seconds, the values from 1 minute to 59 minute and 1 hour.



The **Logger Name** enables the user to name the logger file. The default name is **LOG**. The name can be up to eight characters long. After pressing the **<F1>**, **<F2>** push-buttons, the special window with text editing function is opened.

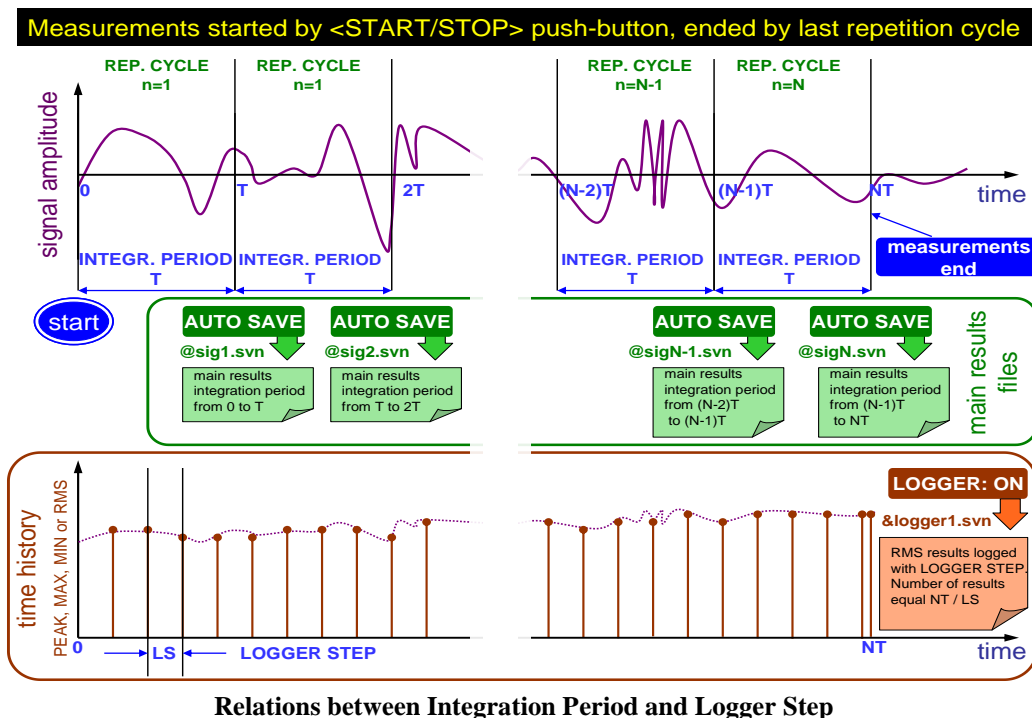


The edited name is accepted and saved after pressing the **<ENTER>** push-button. The special warning is displayed in case a file with the edited name already exists in the memory. The instrument waits then for a reaction of the user (any push-button should be pressed except **<Shift>** or **<Alt>**).



The main measurement results (cf. App. B) are calculated during the period set in the **Integration Period**. These results can be saved in the result files of the instrument's memory by means of the **Save** or **Save Next** function (path: <Menu> / File / File Manager). If **Integration Period** is greater or equal to 10 seconds, it can be done also by means of the **Auto Save** operation. The name of the file for that operation is set in the **File Name** position (path: Menu / File / Save Options / File Name), which appears when **Auto Save** parameter is switched on. In the case when the **Repetition Cycles** is greater than one, the **Auto Save** operation will be performed after the period set by **Integration Period** field. The name of the file with the main results is changed after each saving (file name number increases by one).

When the **Logger** is switch on and the logging results have been defined, then in parallel with measurements during **Integration Period** results, the partial measurement results are saved in the file with the interval step, defined by **Logger Step** parameter. Up to 12 results can be logged simultaneously from three independent user defined profiles of the instrument (**Peak / Max / Min / RMS** for sound measurements or **Peak/ P-P/ Max/ RMS** for Vibration measurements) with time step down to 2 ms. These results are saved in the logger file in the external memory in all modes and functions of the instrument. The recording in the logger's memory is stopped after the period, which is equal to **Integration Period** multiplied by **Repetition Cycles**, after pressing the <Start/Stop> push-button or after stopping the measurements remotely.



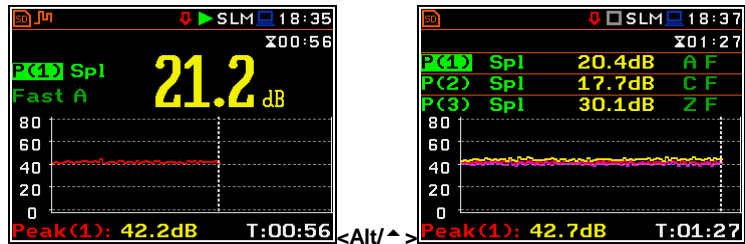
## 5.4.2 Results selection – Logger Results

The **Logger Results** list enables the user to activate the results for three independent user defined profiles, which will be recorded to the logger file during measurement. Activation / deactivation can be done by means of the <◀>, <▶> push-buttons pressed together with <Alt>. The position is changed by means of <◀>, <▶> and <▲>, <▼> push-buttons.



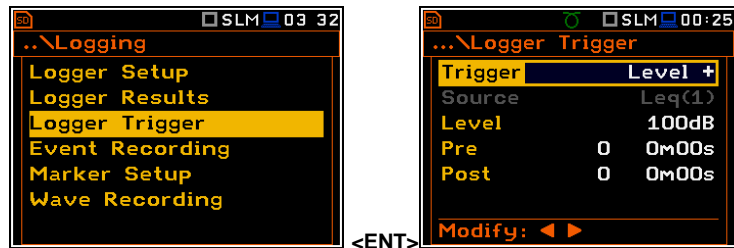
When **Logger** is switched off or there is no results selected for logging the logger plot doesn't appear on the screen.

When **Logger** is switched on and with selected results for logging, the logger plot will be available in all visualisation modes.



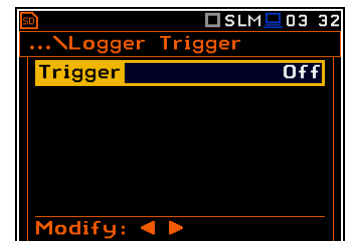
### 5.4.3 Logger trigger parameters setup – Logger Trigger

The **Logger Trigger** parameters influence the way the measurement results are saved in the logger. It is a context sub-list in which: the trigger can be switched off or its type selected (**Trigger**), the source of the triggering signal can be determined (**Source**), its level can be selected (**Level**), the number of the results saved in the logger before the fulfilment of the triggering condition (**Pre**) and the number of the results saved in the logger after the fulfilment of the triggering condition (**Post**).



#### Trigger disabling

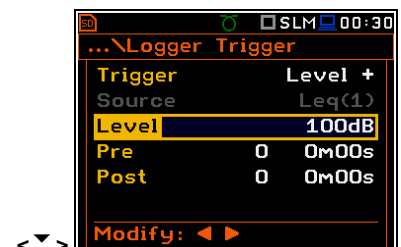
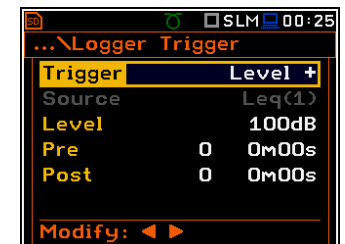
The logger triggering of the measurements (**Trigger**) can be switched off using the **<↑>** push-button. The triggering is switched on if the **Level +** or **Level -** mode is selected using the **<↓>** push-button.



#### Level type trigger

If the triggering signal is greater than the selected in **Level +** or less than **Level -**, the logger contains:

- the measurement results recorded directly before the fulfilment of the triggering condition; time of the recording can be calculated by multiplying the value set in the **Pre** by the time period taken from the **Logger Step** (path: <Menu> / Measurement / Logging / Logger Setup);
- all measurement results up to the moment the triggering signal falls below the **Level**;
- the results recorded directly after the fulfilment of the triggering condition; time of the recording can be calculated by multiplying the value set in the **Post** by the time period taken from the **Logger Step** (path: <Menu> / Measurement / Logging / Logger Setup).



#### Trigger Source selection

When **Level Meter** mode is chosen only one measured result can be used as a source of the triggering signal in the logger, namely the output signal from the RMS detector coming from the first profile which is denoted here as **Leq(1)**. This position does not become active (it is shown greyed out) and the text shown here remains unchanged. After pressing the **<↓>** push-button, the **Source** line is skipped.

When the **1/1 Octave** or **1/3 Octave** mode is chosen it is possible to use the RMS band-pass value of one of the 1/1 octave or 1/3 octave spectrum filters with the appropriate central frequency as the source of the triggering signal for the logger.

Available values of the **Source** parameter for the **1/1 Octave** mode: **Leq (1), 250Hz, 500Hz, 1.00kHz, 2.00kHz, 4.00kHz, 8.00kHz, 16.0kHz.**

Available values for the **Source** parameter for the **1/1 Octave** mode: **Leq (1), 125Hz, 160Hz, 200Hz, 250Hz, 315Hz, 400Hz, 500Hz, 630Hz, 800Hz, 1.00kHz, 1.25kHz, 1.60kHz, 2.00kHz, 2.50kHz, 3.15kHz, 4.00kHz, 5.00kHz, 6.30kHz, 8.00kHz, 10.0kHz, 12.5kHz, 16.0kHz, 20.0kHz.**

#### Level of the triggering signal

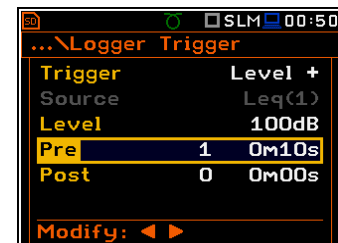
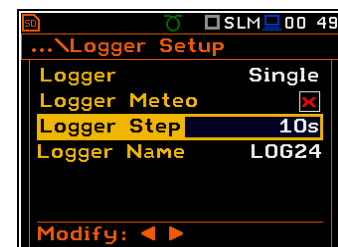
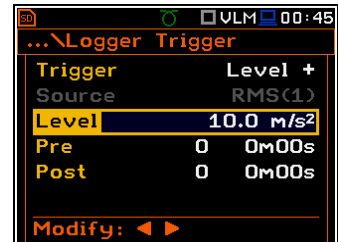
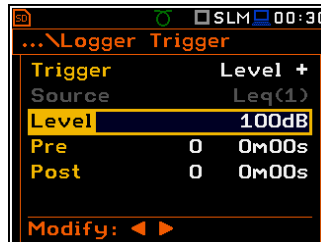
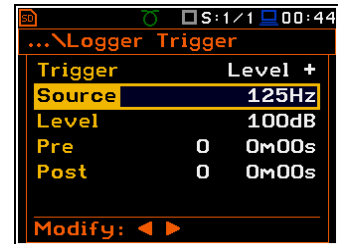
The level of the triggering signal for the logger (**Level**) can be set in sound modes in 1 dB steps in the range from 24 dB to 136 dB and in vibration modes from 1.00 mm/s<sup>2</sup> to 10.0 km/s<sup>2</sup>. The **Level** value of the triggering signal for the logger refers to the instantaneous value of the RMS result from the first profile calculated during the period depending on selected **Detector (1)** (path: <Menu> / Measurement / Profiles).

#### Pre and post trigger recording

In the **Pre** line the number of results recorded in the logger's file before the fulfilment of the triggering condition can be set. This number is within the limits 0..50.

In the **Post** line the number of the results recorded in the logger's file after the fulfilment of the triggering condition can be set. This number is within the limits 0..200.

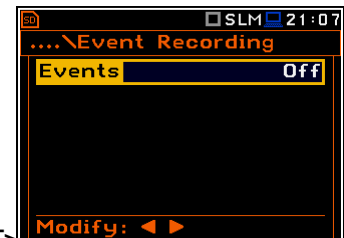
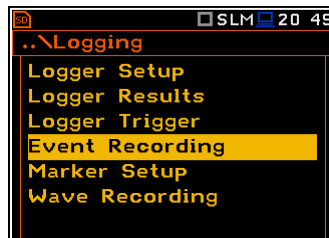
The period of the measurements that are saved in the logger before or after the fulfilment of the triggering condition can be calculated multiplying the value set in the **Pre** or **Post** positions by the value set in the **Logger Step** positions (path: <Menu> / Measurement / Logging / Logger Setup). The result of the calculation is presented in the same line, at the right side of the display.



#### 5.4.4 Event recording setup – Event Recording

The **Event Recording** position enables the user to activate and set the parameters of event waveform signal recording on the external memory (**SD Card** or **USB Disk**).

The **Events** position, if it is not **Off**, defines the type of events recording: **Continuous** or **On Trigger**.



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The **Audio Sampling** position enables the user to select the sampling frequency of the event recording: **12kHz**, **24kHz** and **48kHz**.

When **On Trigger** event recording is chosen then additional positions appear which enable the user to programme the trigger conditions for the event recording.

In the **Trigger** position the following options are available: **Off**, **Slope +**, **Slope -**, **Level +**, **Level -** and **External**.

The **Trigger on Marker** position switches on or off the triggering by marker.

When **Trigger On Marker** is switched on then event recording will start by initiation of one of the user controlled markers. Markers for triggering are defined in the **Markers Setup** window.

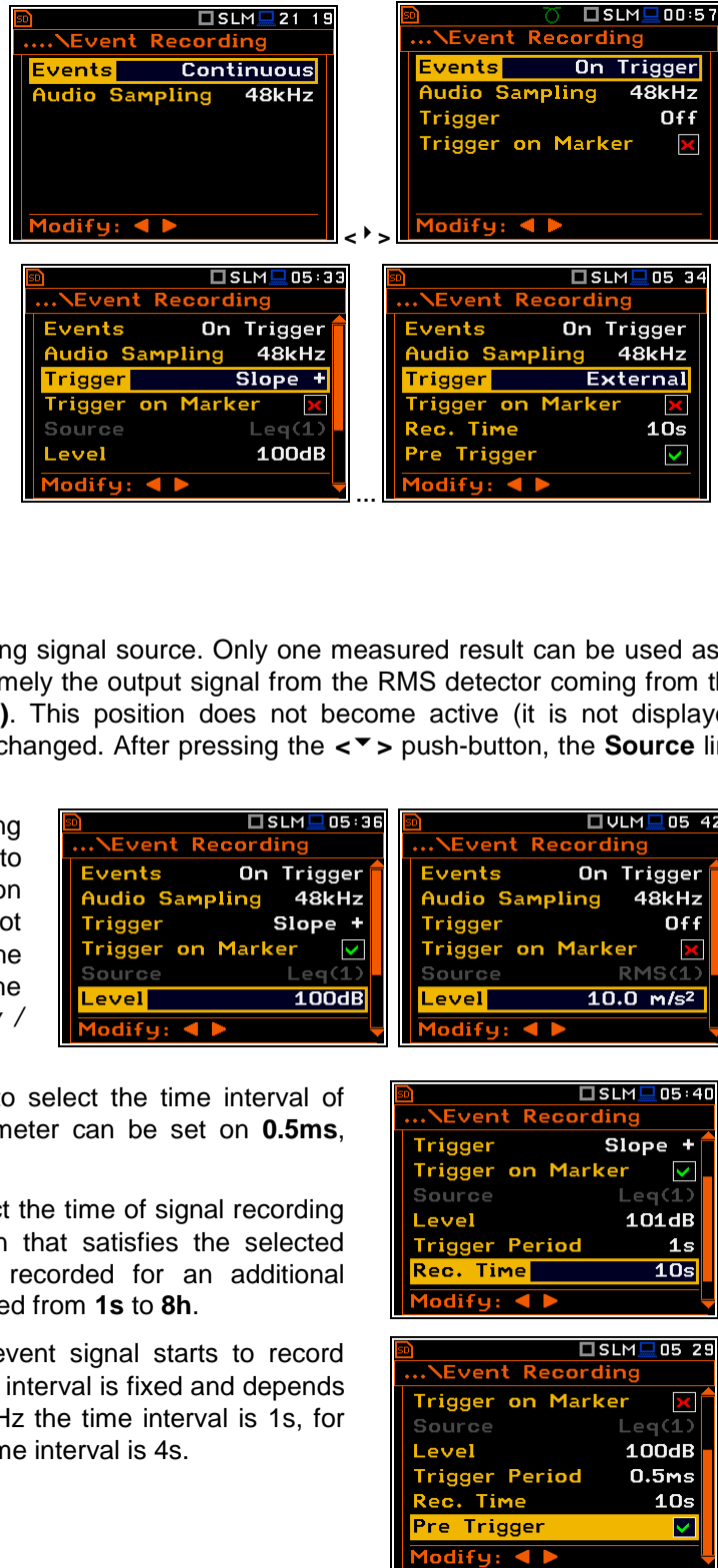
The **Source** position only indicates the triggering signal source. Only one measured result can be used as a source of the triggering signal in all modes, namely the output signal from the RMS detector coming from the first profile which is denoted here as **RMS(1)**. This position does not become active (it is not displayed inversely) and the text shown here remains unchanged. After pressing the <▼> push-button, the **Source** line is skipped.

The level of the triggering signal for recording (**Level**) can be set in a range from 24 dB to 136 dB with 1 dB step. In the case of Vibration measurements the level can be expressed not only in decibels but also in linear units. The vibration unit scale can be set in the **Display Scale** window (path: *Menu / Display / Display Scale / Scale*).

In the **Trigger Period** position it is possible to select the time interval of checking the triggering conditions. This parameter can be set on **0.5ms**, **100.0ms** and **1s**.

In the **Rec. Time** position it is possible to select the time of signal recording after triggering. If another triggering condition that satisfies the selected conditions appears then the signal will be recorded for an additional **Rec. Time**. The available values can be selected from **1s** to **8h**.

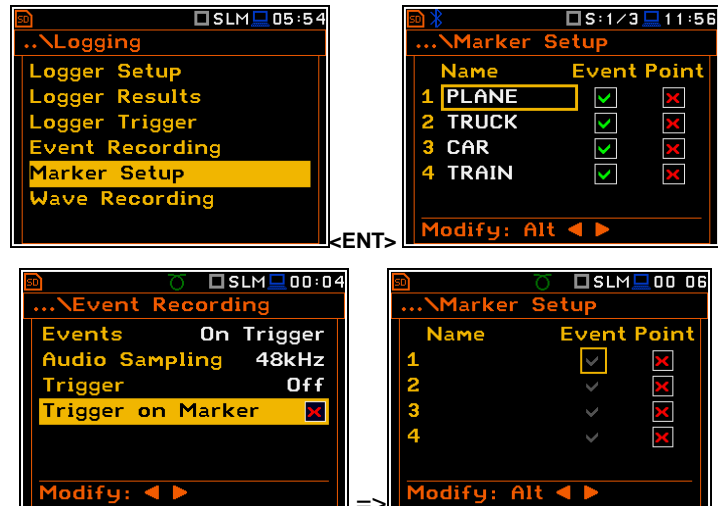
When **Pre Trigger** is switched on then the event signal starts to record before the triggering condition. This time length interval is fixed and depends on the selected sampling frequency. For 48 kHz the time interval is 1s, for 24 kHz the time interval is 2 s, for 12 kHz the time interval is 4s.



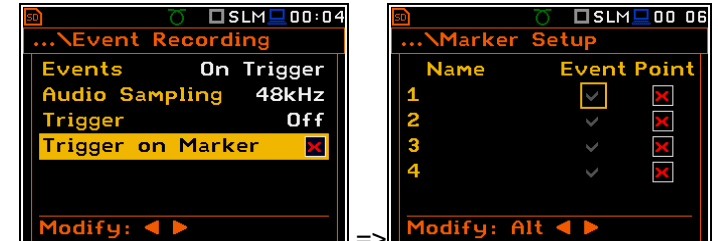
#### 5.4.5 The marker setup – Marker Setup

Marker is used to mark (or highlight) special events during the measurement such as "airplane flight" and is nothing but an indication of the beginning and end of the block of logger results in which the event occurred. In case of point markers there is no start and end of the marker, but only one record in the logger file. Markers are activated in the result presentation window by pressing the arrow keys.

The **Marker Setup** enables the user to assign a specific name for each marker, select its type (normal or **Point**) and define markers for event recording.



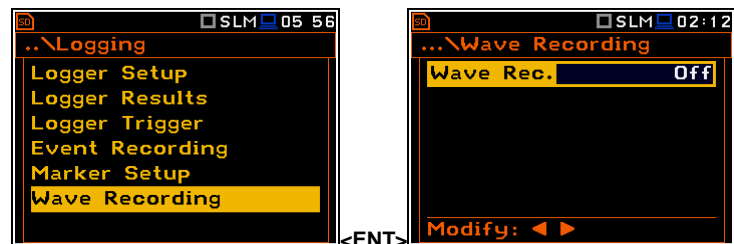
The **Event** column is active only when **Trigger on Marker** (path: **<Menu> / Measurement / Logging / Event Recording**) is switched on.



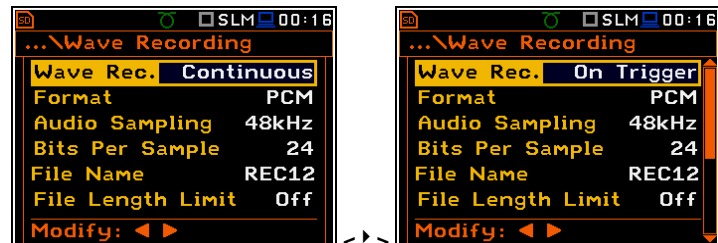
#### 5.4.6 Wave recording setup – Wave Recording

The **Wave Recording** enables the user to activate and to set the parameters of the raw time waveform recording on the external memory (**SD Card** or **USB Disk**).

The **Wave Rec.** position, if it is not **Off**, defines the type of the wave recording: **Continuous** or **On Trigger**.



The **Format** position enables the user to select the format of the wave file header: **PCM** or **Extensible**.



The **Audio Sampling** position enables the user to select the sampling frequency of the wave recording: **12 kHz**, **24 kHz** and **48 kHz**.

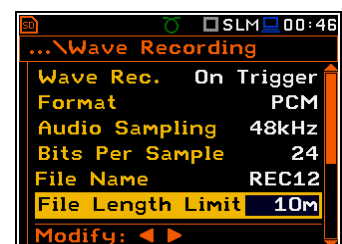
The **Bits Per Sample** position enables the user to select the number of recorded bits per sample: **16** or **24**.

The **Signal Gain** position enables the user to select the gain of the recorded signal, when 16 bits per sample was selected: **0dB** ... **40dB**.

The **File Name** position enables the user to edit the name of the wave file.



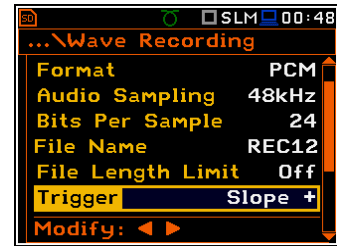
The **File Length Limit** enables the user to define the limit length of the signal record to be saved in the logger file. When **Off** is selected, the signal will be recorded without limitation. To put limitation on record time the user should select the value in the range from 10 min to 8 hours with 10 minute step.





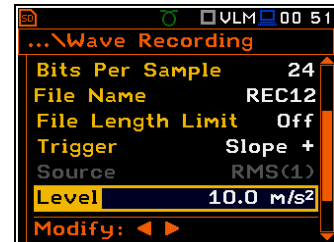
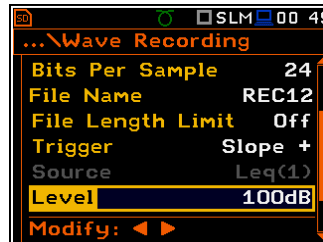
The **Wave Recording** enables the user to activate and programme the wave recorder trigger. This option became active only when the value of the **Wave Rec.** parameter was set as **On Trigger**.

In the **Trigger** position the following options are available: **Slope +**, **Slope –**, **Level +**, **Level –** and **External**.



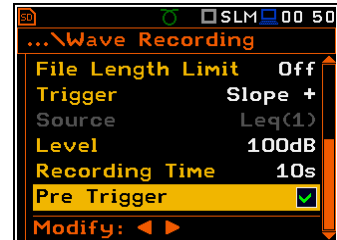
The **Source** position indicates the triggering signal source. Only one measured result can be used as a source of the triggering signal in all modes, namely the output signal from the RMS detector coming from the first profile which is denoted here as **Leq(1)**. This position does not become active (it is not displayed inversely) and the text shown here remains unchanged. After pressing the **<▼>** push-button the **Source** line is skipped.

The level of the triggering signal for recording (**Level**) can be set from 24 dB to 136 dB range in 1 dB steps. In the case of Vibration measurements the level can be expressed not only in decibels but also in linear units. The vibration unit scale can be set in the **Display Scale** window (path: **<Menu> / Display / Display Scale / Scale**).



In the **Trigger Period** position it is possible to select the time interval of checking the triggering conditions. This parameter can be set on **0.5ms**, **100.0ms** and **1s**.

In the **Rec. Time** position it is possible to select the time of signal recording after triggering starts. If another triggering condition that satisfies the selected conditions appears then the signal will be recorded for an additional **Rec. Time**. The available values can be selected from **1s** to **8h** or **Inf**.

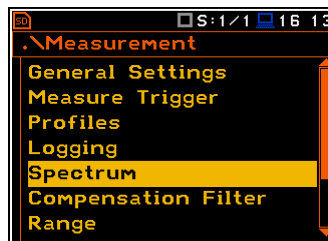


When **Pre Trigger** position is switched on then the signal is recorded immediately before the triggering condition. The interval of such recording depends on the sample frequency. For 48 kHz the time interval is 1s, for 24 kHz the time interval is 2 s, for 12 kHz the time interval is 4s.

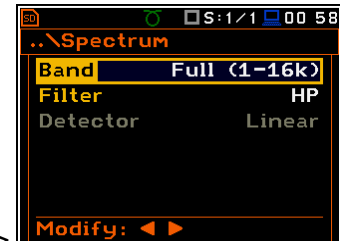
## 5.5 Selection the 1/1 Octave - 1/12 Octave spectrum parameters – Spectrum

The **Spectrum** position appears in the **Measurement** list when the **1/1 Octave**, **1/3 Octave**, **1/6 Octave** or **1/12 Octave** function is selected in the **Measurement Function** list (path: **<Menu> / Function / Measurement Function**).

The **Spectrum** sub-list consists of the parameters, which influence the calculation and logging the results of the **1/1 Octave - 1/12 Octave** analysis: **Band**, **Filter** and **Detector**. The **Spectrum** window is closed ignoring any changes made in there, after pressing the **<ESC>** push-button at any time.



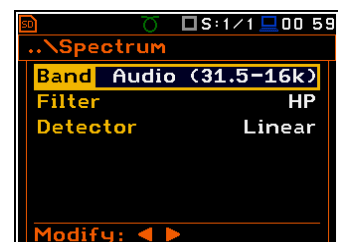
<ENT>



### Selection the band

The **Band** position enables the user to select the applied band of **1/1 Octave - 1/12 Octave** analysis. Available values of the bands of the analysis are as follows:

- Sound 1/1 Octave analysis: **Audio (31.5-16k)** and **Full (1-16k)**;
- Sound 1/3 Octave analysis: **Audio (20-20k)** and **Full (0.8-20k)**;



- Sound 1/6 Octave analysis: **Audio (20-21.4k)** and **Full (0.73-21.4k)**;
- Sound 1/12 Octave analysis: **Audio (20.3-22k)** and **Full (0.71-22k)**;
- Vibration 1/1 Octave analysis: **Full (1-16k)**;
- Vibration 1/3 Octave analysis: **Full (0.8-20k)**;
- Vibration 1/6 Octave analysis: **Full (0.73-21.4k)**;
- Vibration 1/12 Octave analysis: **Full (0.71-22k)**.

### Weighting filter selection

The **Filter** parameter influences the calculations of the **1/1 Octave** - **1/12 Octave** analysis. The frequency characteristics of those filters are given in Appendix D.

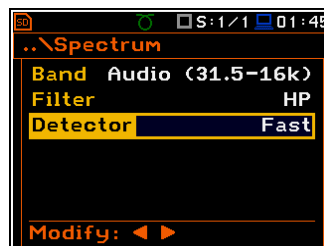
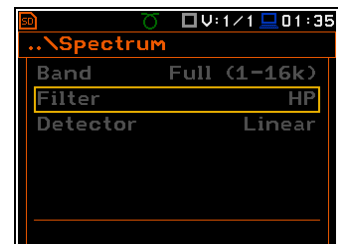
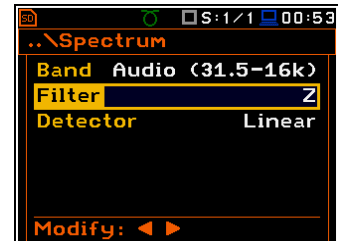
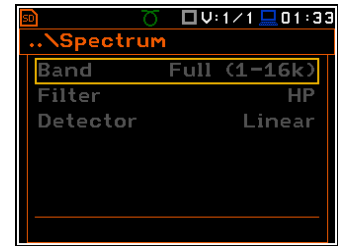
The following pre-weighting filters are available in the case of the **1/1 Octave** - **1/12 Octave** analysis in sound modes:

- **A** type 1 according to the IEC 651 and IEC 61672-1 standards,
- **C** type 1 according to the IEC 651 and IEC 61672-1 standards,
- **B** type 1 according to the IEC 651 standard,
- **Z** type 1 according to the IEC 61672-1 standard
- **HP** type 1 according to the IEC 61672-1 standard (vibration only).

**1/1 Octave - 1/12 Octave .**

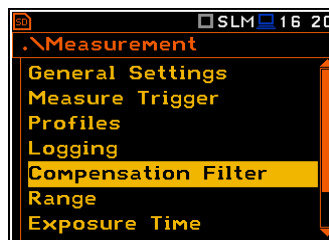
### Selection of the detector

The **Detector** position enables the user to select the detector for the **1/1 Octave** - **1/12 Octave** analysis. In case of Sound measurements it is possible to select for the Audio Band three types of detector: **Linear**, **Fast** and **Slow**. For the Full Band (and for all Vibration measurements) only one **Linear** detector is available.



## 5.6 Selection of the microphone compensation filters – Compensation Filter

The **Compensation Filter** position is available only in the case of the **Sound Meter** or **Direct Sound** modes. It enables the user to select the appropriate frequency response compensation filter and the additional windscreen filter.



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The **Compensation Filter** window consists of a list with 6 positions: **Off**, **Free Field**, **Diffuse Field**, **Outdoor Environ.**, **Outdoor Airport** and **Windscreen**. The position in the sub-list is changed after pressing the **<^>**, **<v>** push-buttons. In order to switch the filter on the user should mark it, by means of the **<^>**, **<v>** push-buttons, and to confirm the selection with the **<ENTER>** push-button. Pressing **<ENTER>** push-button closes the sub-list. After pressing the **<ESC>** push-button the sub-list is also closed but any changes will be ignored.

The **Free Field** and **Diffuse Field** filters enable the user to set compensation for sound measurements in the free field conditions or in the diffuse field conditions. The microphone supplied with the **SVAN 979** instrument (GRAS 40AE) is designed for sound measurements in free field conditions. The **Free Field** option means that the correction filter for the diffuse field conditions is switched off. In the case of sound measurements performed with the use of different specific diffuse field response microphone types the option **Diffuse Field** should never be used and the compensation filter should be turned off.

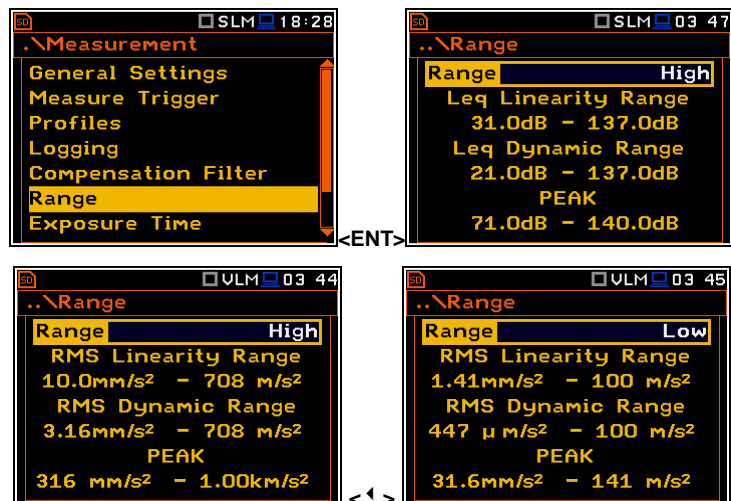
**Outdoor Environ.** and **Outdoor Airport** filters are dedicated for the permanent outdoor monitoring application. The characteristics of the outdoor filters depend on the application: environmental (the acoustic signal is parallel to the microphone's grid) or airport (the acoustic signal is perpendicular to the microphone's grid). The frequency characteristic of the designed filters is given in App. D. **Windscreen** filter can be switch **Off**, **On** or set to automatic detection – **Auto**.

## 5.7 Measurement range setting – Range

The **Range** position is used to set one of the available measurement ranges in the instrument.

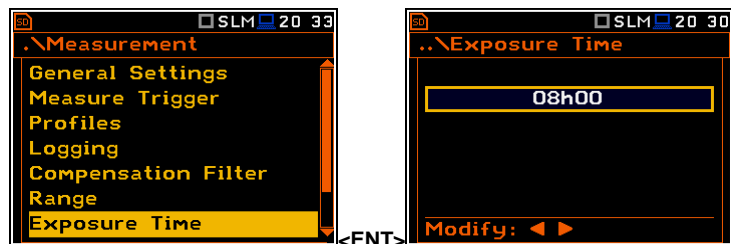
The absolute range values changes due to the current calibration factor and are shown on the screen of the instrument.

There are two ranges available **High** and **Low**. The detailed description of the measurement ranges parameters is given in App. C. After pressing the **<ENTER>** push-button the change is confirmed and the window closes. Press the **<ESC>** push-button to return to the **Measurement** list ignoring any changes made in the sub-list.

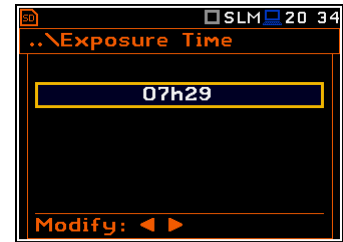


## 5.8 Exposure time setting - Exposure Time

The **Exposure Time** enables the user to set the desired value of the workday exposure time that is used for the calculation of **LEPd** (cf. App. D for the definitions of the functions). This sub-list is available only in the sound mode; in Vibration and voltage (Vibration) modes it is taken off from the **Measurement** list.



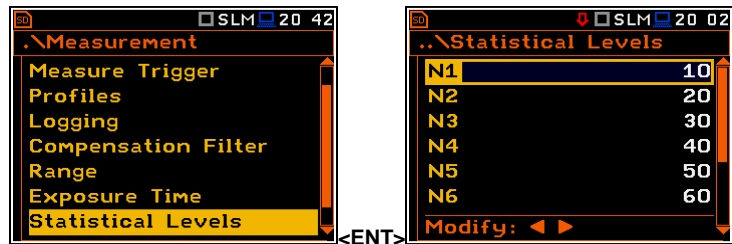
The **Exposure Time** values are within the range [00h01, 08h00]. The required value can be set using the <◀> / <▶> push-buttons – after each button press the exposure time is decremented / incremented by one minute. The step can be decremented / incremented in 30 minutes steps by pressing the <◀> / <▶> push-buttons together with <Shift>.



## 5.9 Setting ten statistical levels - Statistical Levels

The **Statistical Levels** position is available only in the case of the sound measurements (in the **Sound Meter** or **Voltage (Sound)** modes).

In the **Statistical Levels** window it is possible to define ten statistical LN% levels, named from **N1** to **N10**, to be calculated, displayed and saved in the files together with the main results.



The default statistical levels have the following settings: **10, 20, 30, 40, 50, 60, 70, 80, 90** and **95**. All values have to be within the integer range [1, 99]. Each individual value can be set independently from the others. The selection of the **Nx** in the list is made by means of the <▲>, <▼> push-buttons.

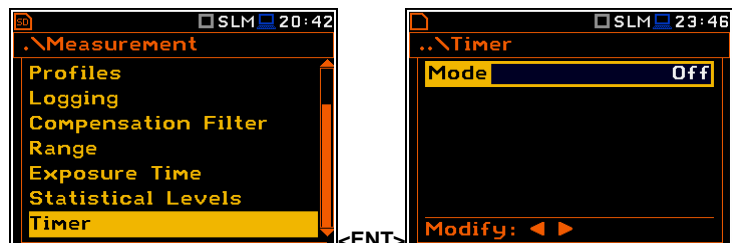
The first **Nx** is visible on the display and becomes active for editing after pressing the <▲> push-button together with <Shift>. The last **Nx** is visible on the display and becomes active for editing after pressing the <▼> push-button together with <Shift>.

The **Nx** current value is decreased / increased in 1 % steps by means of the <◀> / <▶> push-buttons. The step can be decreased / increased up to ten % by simultaneously pressing the <◀> / <▶> push-buttons with <Shift>.

The sub-list is closed and the instrument returns to the **Measurement** list after pressing the <ENTER> (with the confirmation of all changes made in this list) or <ESC> push-button (ignoring all changes).

## 5.10 Programming the instrument's internal timer – Timer

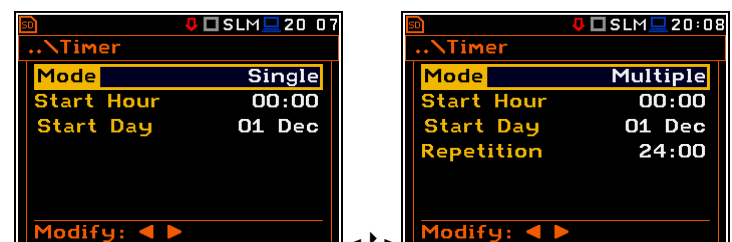
The **Timer** position enables the user to programme the internal real time clock to act as a delayed start and stop timer. The instrument can be switched on automatically at the pre-selected programmed time and perform the measurement with the same settings used before the instrument was switched off.



### Selecting the mode of the timer function

The timer can be switched off – **Off**, switched on only once – **Single**, or switched on many times regularly – **Multiple** with the period between two consecutive measurements set in the **Repetition** line.

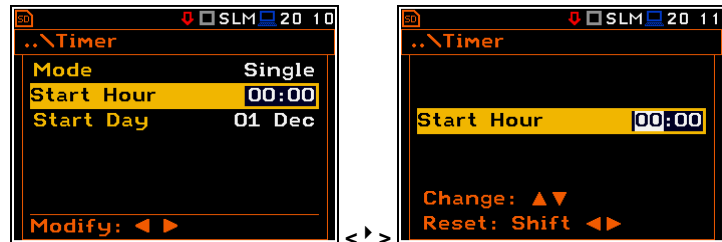
In the case where the timer function is active (**Single** or **Multiple**) and the



instrument is switched on the “clock” icon appears until the measurements are finished.

### Setting the time for the measurement to start

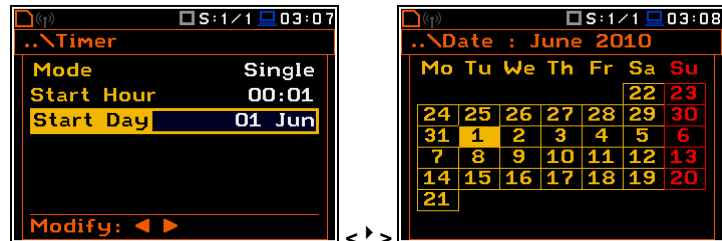
The **Start Hour** position determines the time for the measurement to start. The required hour and minute can be selected in a special window, which is opened by means of the <◀>, <▶> push-buttons.



In order to set hours or minutes the user has to enter the left or right field by pressing the <◀>, <▶> push button and then select the proper value by means of the <▲>, <▼> push-buttons and finally to press <ENTER>.

### Setting the day for the measurement to start

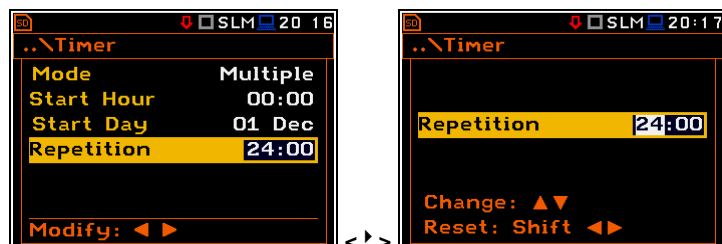
The **Start Day** position determines the date for the measurement to start. The timer can be programmed up to one month ahead and during the date setting the current state of the **Real Time Clock (RTC)** is taken into account. The required date can be selected in a special window, which is opened by means of the <◀>, <▶> push-buttons.



In order to set date the user has to select its position by means of the <◀>, <▶> and <▲>, <▼> push button and then press <ENTER>.

### Selecting the period between two consecutive measurement start times

The **Repetition** position is displayed when the **Multiple** mode is selected. This parameter can be programmed in the range from 00:00 up to 99:59. The required time can be selected in a special window, which is opened by means of the <◀>, <▶> push-buttons when the **Repetition** text is displayed inversely in the **Timer** sub-list.



In order to set the proper value the user has to select hours or minutes pressing the <◀>, <▶> push-buttons and then, pressing the <▲>, <▼> push-buttons to select the proper value.



**Notice:** The instrument's Timer function can be used for multiple measurements (at the programmed day and time with the selected repetition number). The first switch on and recording of the instrument must be within one month ahead. Make sure that the RTC is set correctly before trying to set a value for a delayed Start/Stop Timer.



**Notice:** Make sure that there is sufficient power available for the instrument to carry out the required measurement when it wakes up and starts the recording.

## 5.11 Description of an exemple timer function

The **Timer** function is used to programme the instrument to switch on at the desired time and perform the measurements with the parameters set in the **Measurement** sub-list.

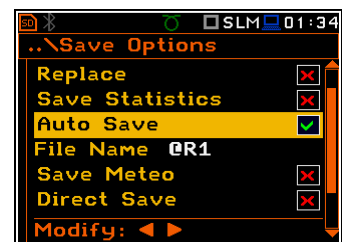
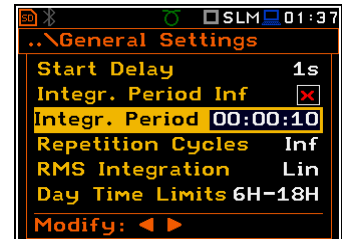
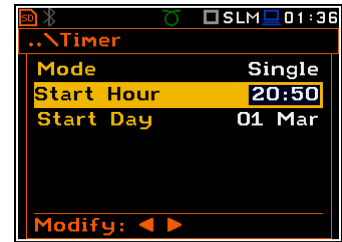
Let us assume that the user wants to switch on the instrument the 1<sup>st</sup> of March, at 20:50, measure the sound for 10 seconds without using logger and save the results in a file named R1.

In order to do this the user has to set the parameters of the **Timer** function, the measurement parameters (*path: <Menu> / Measurement / General Settings*), activate the **Auto Save** function (*path: Menu / File / Save Options*), name the file (the **File Name** window is opened after switching on the **Auto Save** function) and finally – switch off the instrument.

The instrument will be switched on the 1<sup>st</sup> of March at 20:50 and will be warmed up for the period of 60 seconds decrementing the counter visible on the display by one after each second.

After warming up the instrument and the preset **Start Delay** time, the measurements will be performed for a period of ten seconds. Then, the results will be saved in the previously named file and finally – the instrument will switch off.

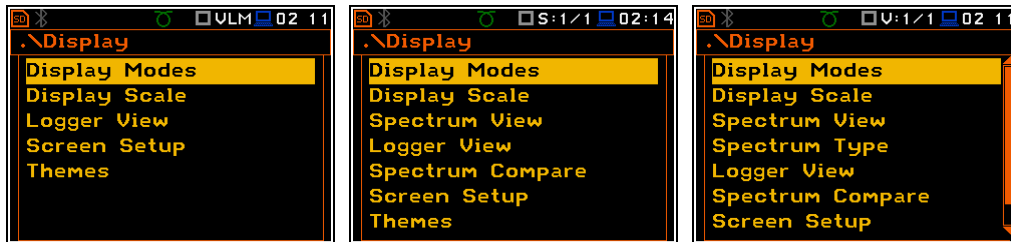
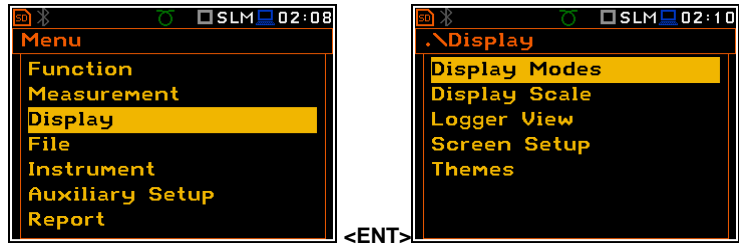
In this example the delayed start time on the meter can be configured any time during the previous month. It is recommended that for simplicity the **Start Delay** time is set to 0 seconds for use with the **Timer** function.



## 6. DATA AVAILABLE ON THE DISPLAY – Display

The **Display** list contains the elements that enable the user to independently programme the display parameters.

The content of the **Display** list differs for different modes and functions. Below are examples of the **Display** list for the modes VLM, S:1/1 and V:1/1.



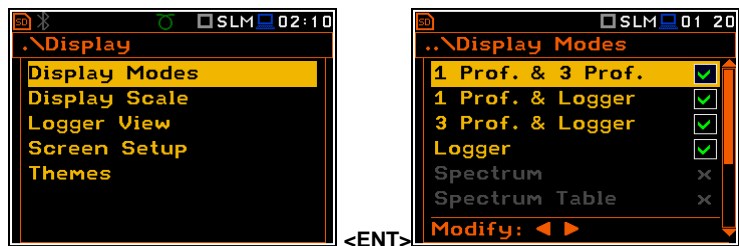
The **Display** list is used for setting the various parameters, which are dedicated to the control of the LCD screen display and contains the following items:

<b>Display Modes</b>	enables the user to select the mode of the measurement results presentation;
<b>Display Scale</b>	enables the user to change the scale in the graphical modes of result's presentation;
<b>Spectrum View</b>	enables the user to change the type of the spectrum and to activate the <b>Max</b> and <b>Min</b> spectrum. This position appears only in <b>1 1 Octave - 1/12 Octave</b> modes;
<b>Spectrum Type</b>	enables the user to change the spectrum type presented on the display: <b>Acceleration</b> , <b>Velocity</b> and <b>Displacement</b> . This position appears only in <b>1 1 Octave - 1/12 Octave</b> modes when the <b>Vibration Meter</b> mode is selected;
<b>Logger View</b>	enables the user to select and present the results stored in the logger's files;
<b>Spectrum Compare</b>	enables the user to compare spectrum with the reference one. This position appears only in <b>1 1 Octave - 1/12 Octave</b> modes;
<b>Screen Setup</b>	enables the user to set the brightness and the switch on/off the energy saver function;
<b>Themes</b>	enables the user to set the colour theme of the display.

### 6.1 Selection of the modes of measurement results presentation - Display Modes

The One Profile mode is always available in all measurement modes. Other presentation modes can be switched on or off in the **Display Modes** sub-list.

The mode of the results presentation is related to the selection of the instrument's function (SLM or VLM, 1/1 Octave, 1/3 Octave, etc.).



For the **Sound Level Meter** the following display modes are available: **1 Prof. & 3 Prof.**, **1 Prof. & Logger**, **3 Prof. & Logger**, **Statistics**, **File Info**, **Meter Table**, **GPS** and **Signal Generator**.

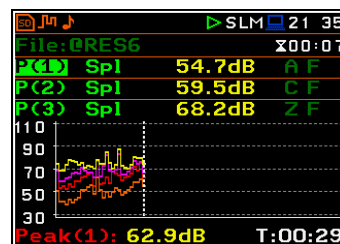
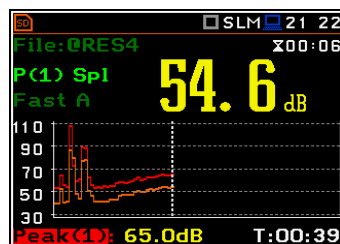
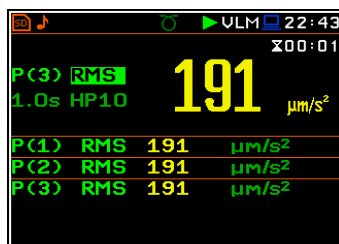
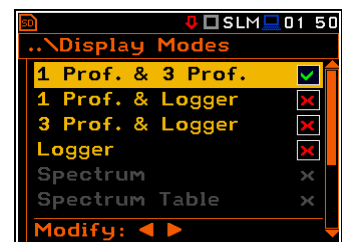
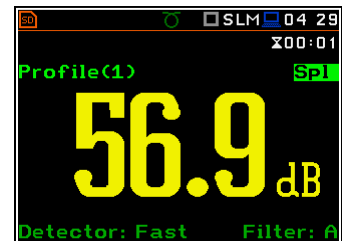
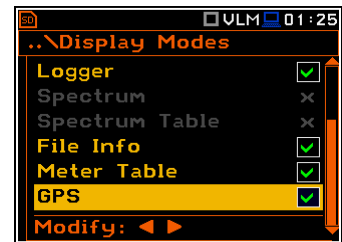
For the **Vibration Level Meter** the following display modes are available: **1 Prof. & 3 Prof.**, **1 Prof. & Logger**, **3 Prof. & Logger**, **File Info**, **Meter Table**, **GPS** and **Signal Generator**.

### One Profile presentation mode

The One Profile presentation mode is always available in all measurement modes. The display with the measurement result in One Profile mode is presented here.

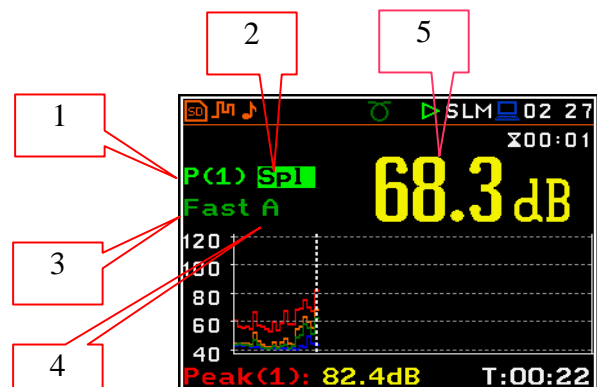
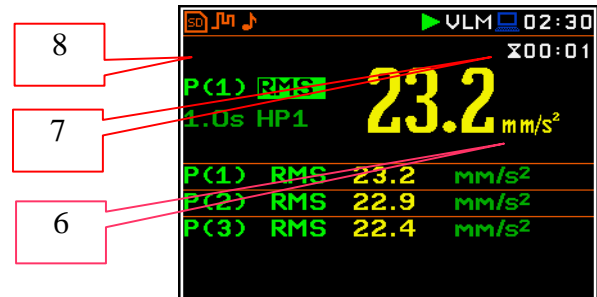
### Combined presentation modes

There are three presentation modes, which combine two views and can be activated or not: **1 Prof. & 3 Prof.**, **1 Prof. & Logger**, **3 Prof. & Logger**. These combined views allow the user to compare results for profiles and to follow the history of measured results, saved in the logger file.



### Fields description of the One Profile view

1. Profile number.
2. Function name: **Spl**, **Leq**, **Sel**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **LN%**, **Ovl**, **Peak**, **Max**, **Min** in the case of Sound measurements or **RMS**, **Ovl**, **Peak**, **P-P**, **MTVV** in the case of Vibration measurements.
3. Detector time constant: in the case of Sound measurements when the detector is exponential: **IMP.**, **FAST**, **SLOW** or **Lin** when the detector is linear and in the case of Vibration measurements: **100 ms**, **125 ms**, **.. 10.0 s**, ...
4. The name of the implemented filter: **Z**, **A**, **C**, **B**, **G** in the case of Sound measurements or **HP**, **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10**, **Wh** in the case of Vibration measurements.
5. The value of the measured function.
6. Units of the measured value.
7. Elapsed time shows the current second of the measurement. The value presented there belongs to the range [1, Integration Period].
8. File name when Auto Save Function is activated (path: <Menu> / File / Save Options / Auto Save:☑)



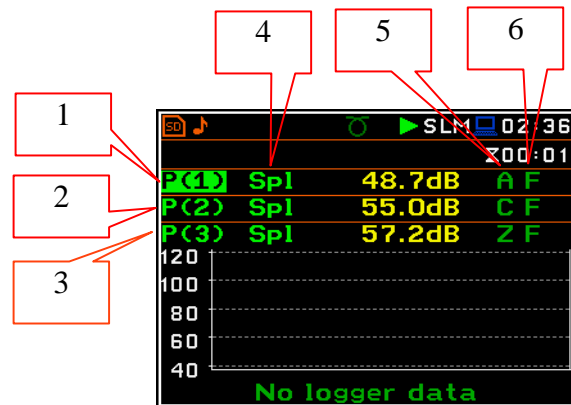
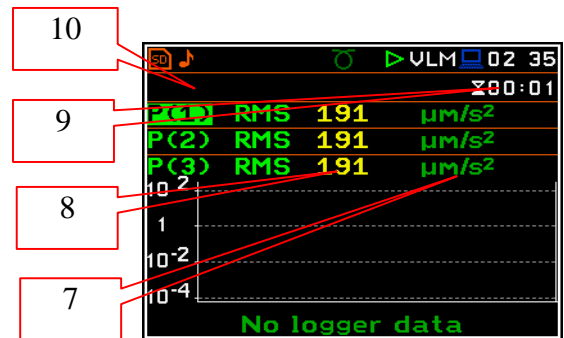
**Notice:** In the case the **RMS Integration** is linear (path: <Menu> / Measurement / General Settings / RMS Integration: Lin) for the **Leq**, **Sel**, **Lden**, **LEPd** and **LN%** results **Lin.** text appears on the display instead of **Imp.**, **Fast** or **Slow** detector time constant.



**Notice:** There is no displayed indication of the detector in the case of **Peak** and **Ovl** results.

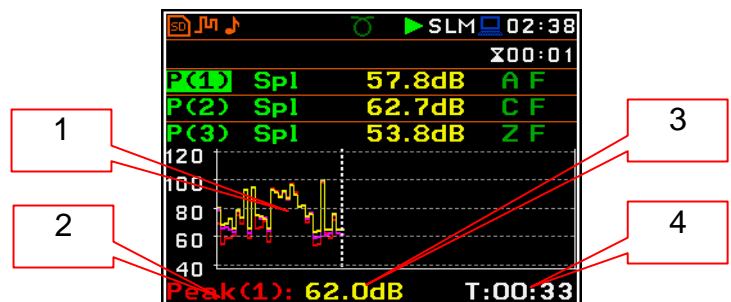
### Field description of the 3 Profiles view

1. Result line for Profile 1.
2. Result line for Profile 2.
3. Result line for Profile 3.
4. Function name: **Spl**, **Leq**, **Sel**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **LN%**, **Ovl**, **Peak**, **Max**, **Min** in the case of Sound measurements or **RMS**, **Ovl**, **Peak**, **P-P**, **MTVV** in the case of Vibration measurements.
5. The name of the implemented filter: **A**, **C**, **Z** in the case of Sound measurements. In the case of Vibration measurements this field is skipped.
6. Detector time constant: in the case of Sound measurements when the detector is exponential: **IMP**, **(I)**, **FAST (F)**, **SLOW (S)** or **Lin (L)** when the detector is linear. In the case of Vibration measurements this field is skipped.
7. Units of the measured value.
8. The value of the measured function.
9. Elapsed time shows the current second of the measurement. The value presented there belongs to the range [1, Integration Period].
10. File name when **Auto Save** function is activated (path: <Menu> / File / Save Options / Auto Save:☑)



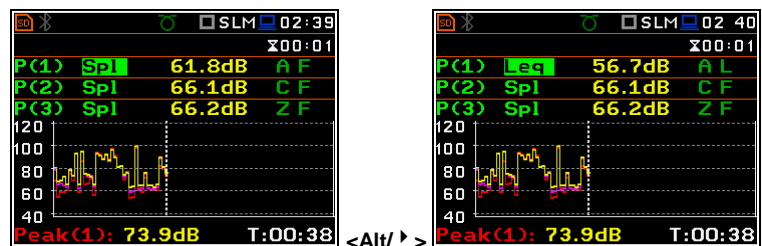
### Field description of the Logger view

1. Logger Plot
2. Function name (Profile number)
3. Function value for cursor position
4. Cursor time position



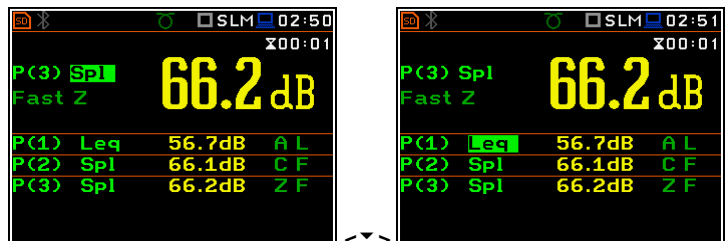
### Changing the field content

The content of some fields can be changed after pressing the <◀> and <▶> push-buttons together with <Alt>.



### Changing the active fields

Changing the active field is made by pressing the <▲> / <▼> (vertically) or <◀> / <▶> (horizontally) push-buttons.



### Changing the presentation mode

The presentation display screen mode is changed after pressing the <▲> or <▼> push-buttons together with <Alt>.

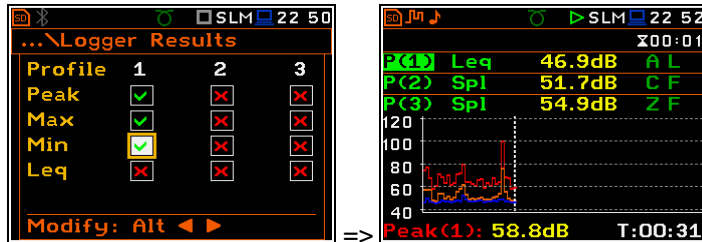
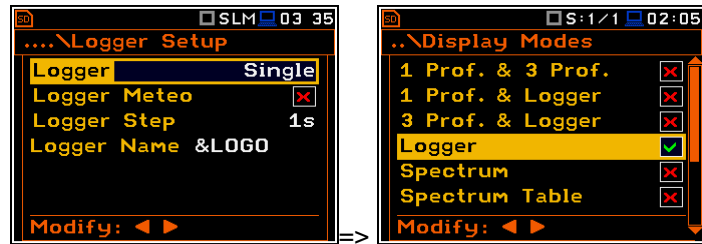


### Logger presentation mode

The **Logger** presentation mode depends on the settings made in the **Logging** list (path: <Menu> / Measurement / Logging). If **Logger** (path: <Menu> / Measurement / Logging / Logger Setup) is switched off the **Logger** presentation mode is **not** active!

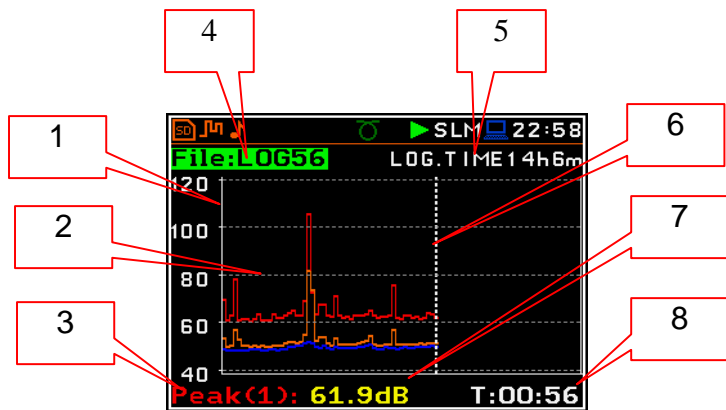
So, to have this presentation mode active, the user has to switch the **Logger** on!

When **Logger** is switched on and there are results selected for logging then the screen in one profile visualisation mode is as shown here.

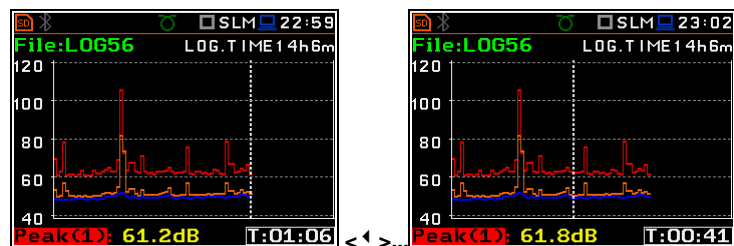


### Field description of the Logger view

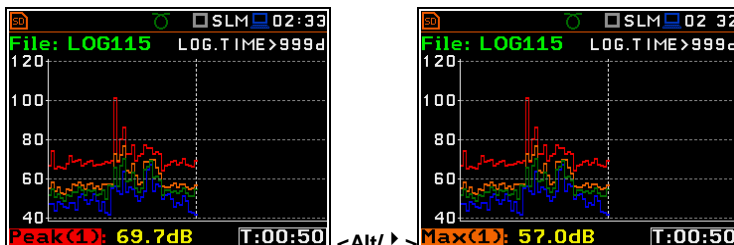
1. Y-scale
2. Logger plot
3. Name of the logged result and profile number
4. Name of the logger file
5. Log. Time displays the time available for recording the logging results (limited by available memory space)
6. Cursor position
7. Result value for the cursor position
8. Cursor time position



The user may change the cursor position by means of the <◀>, <▶> push-buttons.

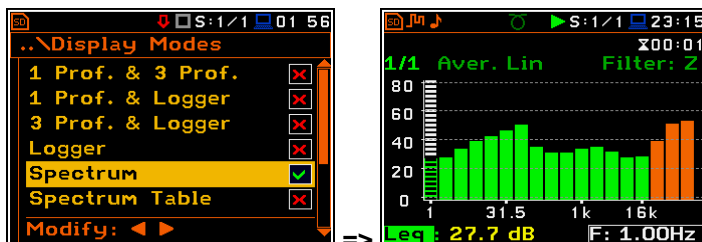


To switch the cursor from one curve to another the user should select the field in the bottom left corner of the display by means of the <▲>, <▼> push-buttons. Then select the appropriate curve by means of the <◀>, <▶> push-buttons pressed together with <Alt>.



### Spectrum presentation mode

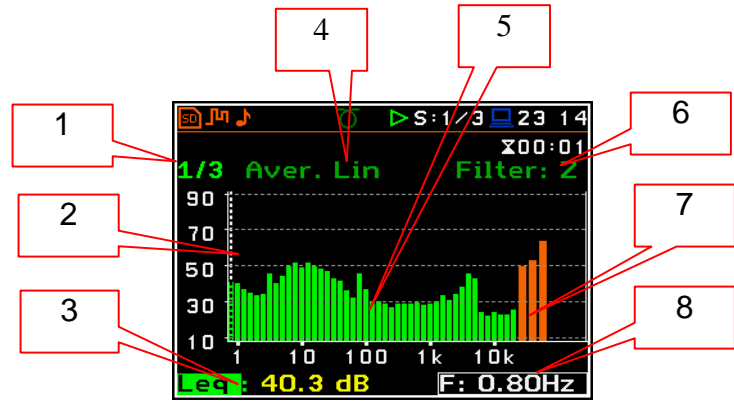
The **Spectrum** position is accessible only for active 1/1 Octave, 1/3 Octave and FFT functions (path: <Menu> / Function / Measurement Function).



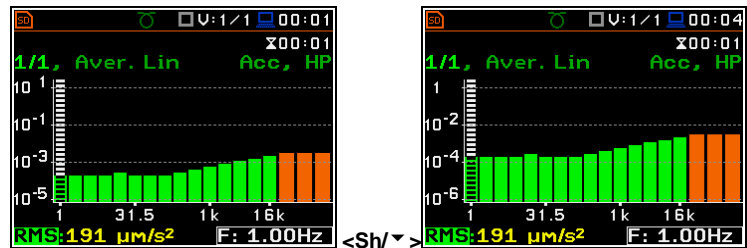


### Fields description of the Spectrum view

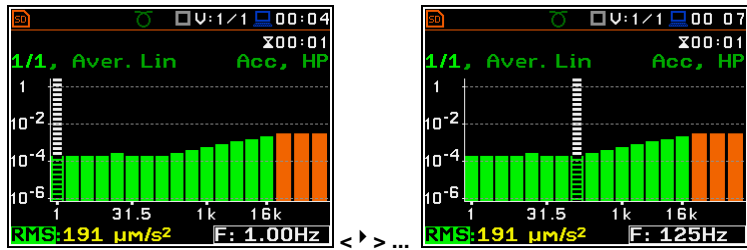
1. Averaging type
2. Cursor position
3. Value for the cursor position
4. Averaging used (**Lin** or **Exp**)
5. Spectrum plot
6. Frequency weighting filter used
7. Total values
8. Central frequency for the cursor position.



The user may shift the Y-axis during the spectrum presentation after pressing the **<Shift>** and **<^>** (or the **<Shift>** and **<v>**) push-buttons.

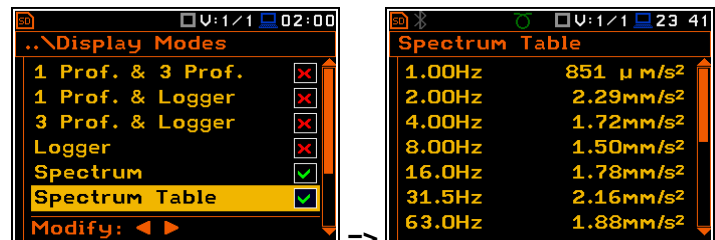


The user may change the cursor position by means of the **<^>**, **<v>** push-buttons. The frequency and the appropriate value are presented in the line below the plot. Press the **<^>**, **<v>** push-buttons with **<Shift>** to move straight to the first or last displayed band on screen.



### Switching on/off spectrum table view

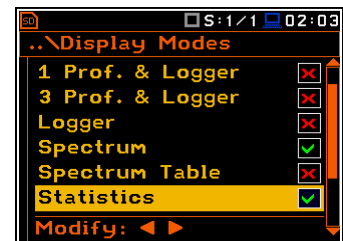
The **Spectrum Table** position is accessible in **1/1 Octave - 1/12 Octave** function (path: **<Menu> / Function / Measurement Function**).



### Statistics presentation mode

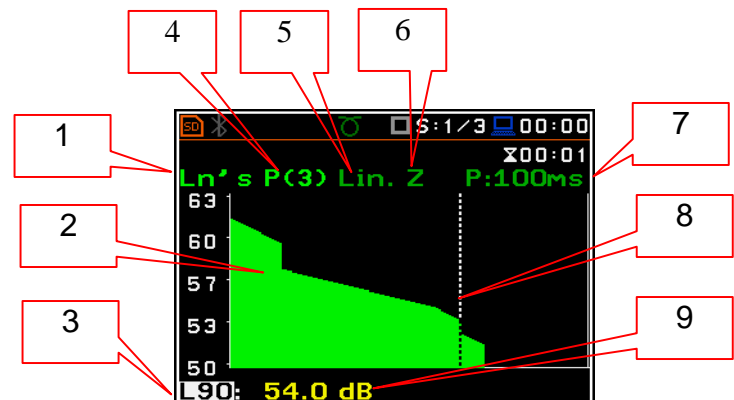
The **Statistics** position is accessible only for **Sound** measurements.

Statistics is the cumulative probability density function of exceeding the noise level during the measurement period. The X axis defines the probability of exceeding the noise level, statistical level **LN%**, and the Y axis defines the calculated noise level in dB.



### Field description of the Statistics view

1. Function name
2. Statistics plot
3. Statistical level (LN% percentile value) for the active cursor position
4. Active profile (P1, P2 or P3)
5. RMS detector (**Lin.**, or **Exp.**: **Fast**, **Slow** or **Imp.**)
6. Frequency filter used (**A**, **C** or **Z**)
7. The sampling interval for the LN% values calculated by the meter (0.1 s)
8. Cursor position
9. Value of the selected statistical level



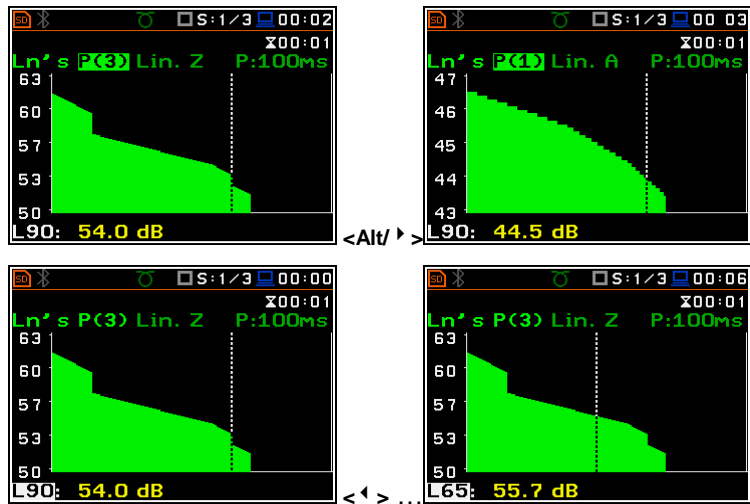
### LN% and units (dB)

The change between positions is made by pressing the <▲> or <▼> push-buttons.

When position is chosen, its value is changed by pressing the <◀> and <▶> push-buttons simultaneously with <Alt>.

When the LN% field is active the user may change the cursor position using the <◀>, <▶> push-buttons. The statistical level (%) and appropriate (dB) value are presented in the line below the plot.

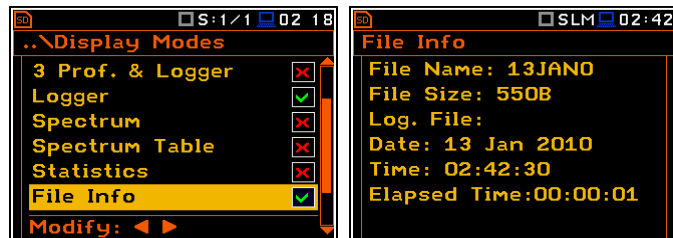
Press the <◀>, <▶> push-buttons with the <Shift> button to go straight to the first or last LN% position on the screen.



### File information presentation mode

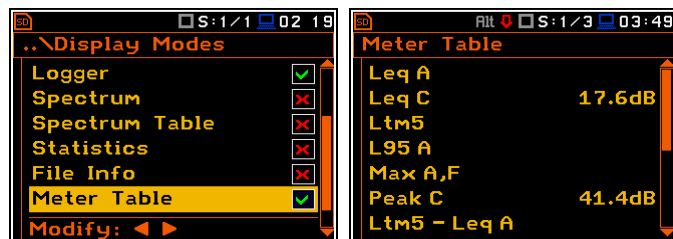
The **File Info** position switches on or off the additional file information description during the measurement.

The **File Info** window indicates the file name, its size, date and time of the recording of the main results (cf. App. B) and time (**Elapsed Time**) during which the main results saved in the logger were measured. The value presented there is in the range [1, **Integration Period**] and depends on the moment and the way the measurements were stopped.



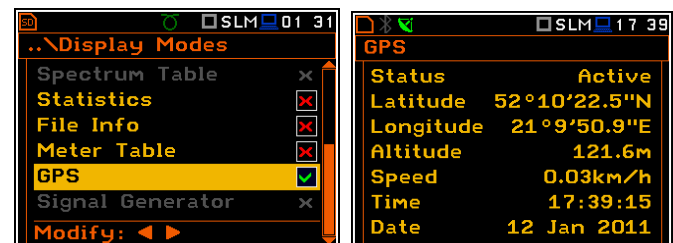
### View of the measurement results

The measured results may be also displayed as a list of all measured functions in profiles with assigned frequency filters and time constants. In case the same functions are set up in two profiles the results for the first profiles will be displayed.



### View of the GPS information

The **GPS** view enables the user to display the information from GPS-device connected to the USB port of the instrument. The **GPS** view will be active only if options **GPS Host Port** or **GPS Device Port** are active (path: <Menu> / Instrument / Communication Ports).



## Signal Generator

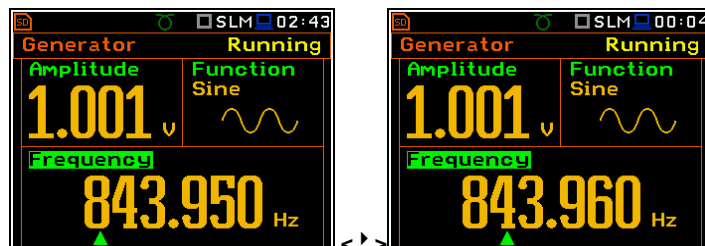
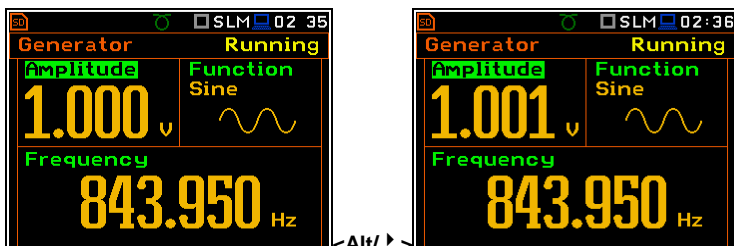
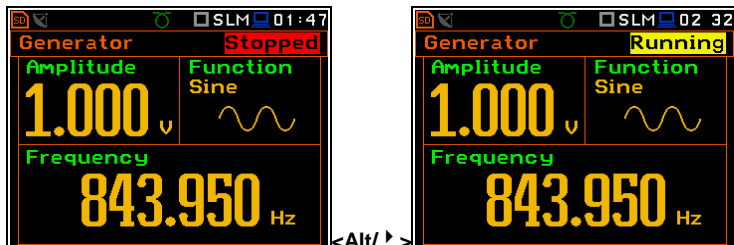
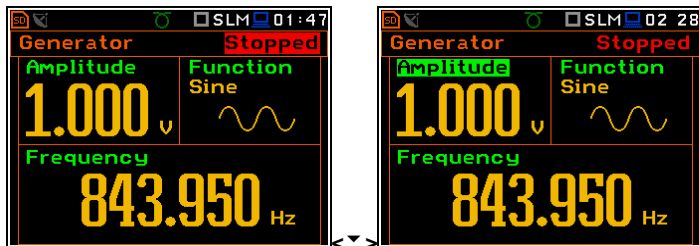
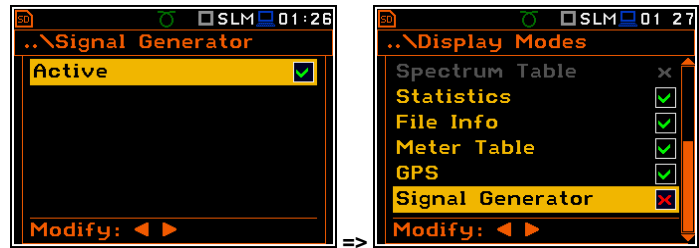
The **Signal Generator** view enables the user to access the display screen, which controls the signal generator function of the instrument. This position is active only when the **Signal Generator** function is switched on (**Active**) in the **Instrument** menu (path: <Menu> / *Instrument* / *Signal Generator*).

In the **Signal Generator** view the user may move from one field to another with the use of the <▲> or <▼> push-buttons and to change the field value pressing the <◀> and <▶> push-buttons pressed simultaneously with <Alt>.

To switch the **Signal Generator** on or off the user has to select the **Generator** field and change its value from **Stopped** to **Running** by means of the <◀> or <▶>, push-button, pressed together with <Alt>.

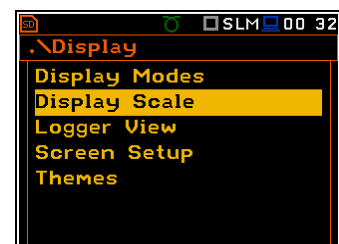
To change the amplitude of the generated signal the user should select the **Amplitude** field and to change its value by means of the <◀> and <▶> push-buttons pressed together with <Alt>.

To change the frequency of the generated signal the user should select the **Frequency** field, then select the digit to be changed by means of the <◀> and <▶> push-buttons. The digit selection will be marked by green cursor (arrow) at the bottom line of the screen. The user may change the value of the selected digit by means of the <◀> and <▶> push-buttons pressed simultaneously with <Alt>.



## 6.2 Setting scale and grid of the plot - Display Scale

The **Display Scale** sub-list enables the user to change the displayed dynamic scale in the available modes of graphical presentation of the measurement results and switch the horizontal grid lines on or off.



### Scale of the plot

The **Scale** position is accessible only in the case of Vibration measurement modes. Two options are available: **Lin** (linear) and **Log** (logarithmic). In case of the **Lin** the graphical presentation and the units are linear. In case of **Log** the graphical presentation is given in the logarithmic scale and the measurement results are expressed in decibels (the result is relative to the values set in the **Reference Levels** window (path: <Menu> / Auxiliary Setup / Reference Levels).

In case of the sound measurements the **Scale** position is not active. All results are presented logarithmically in dB.



**Notice:** In the Vibration modes the parameters can be presented in logarithmic (decibels) or linear ( $m/s^2$ ) units. It depends on the **Display Scale** position (path: <Menu> / Display / Display Setup / Display Scale / Log or Lin), e.g.  $10 m/s^2$  can be presented as 140 dB.

### Scaling the vertical axis of the plot

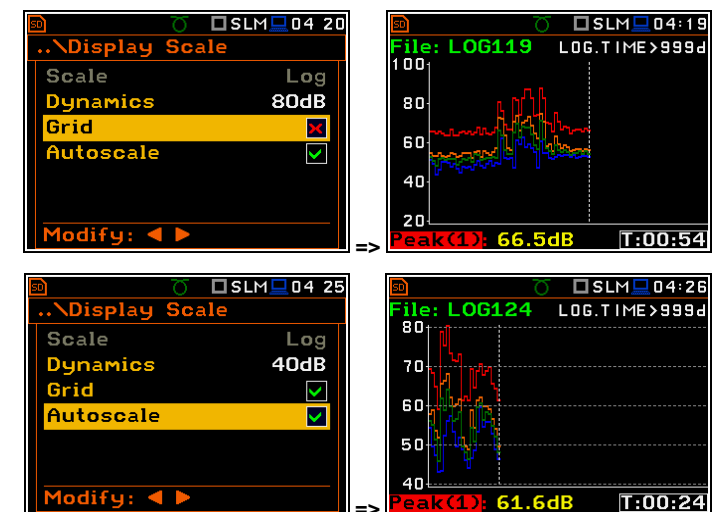
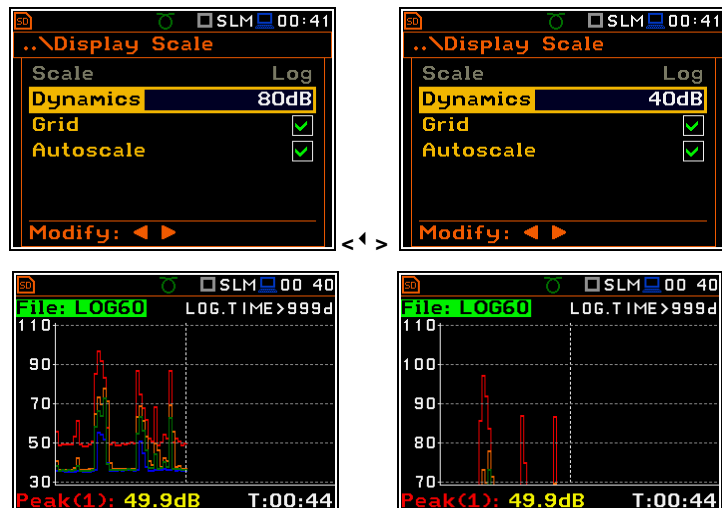
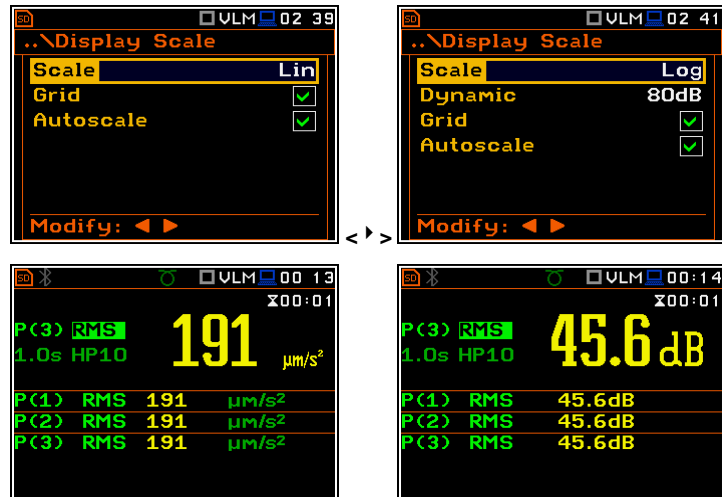
The **Dynamic** position enables the user to select the required dynamic range scaling of the plot in the graphical presentation mode. The user can obtain double, four times and eight times expansion of the vertical axis (the default vertical axis corresponds to **80 dB**, after expansion it corresponds to **40 dB**, **20 dB** and **10 dB** – respectively). Two additional settings are available at **100 dB** and **120 dB** range. Select the required range using the <◀> and <▶> push-buttons.

### Switching the plot grid on/off

The **Grid** position enables the user to switch on or off the horizontal plot grid lines in any graphical presentation.

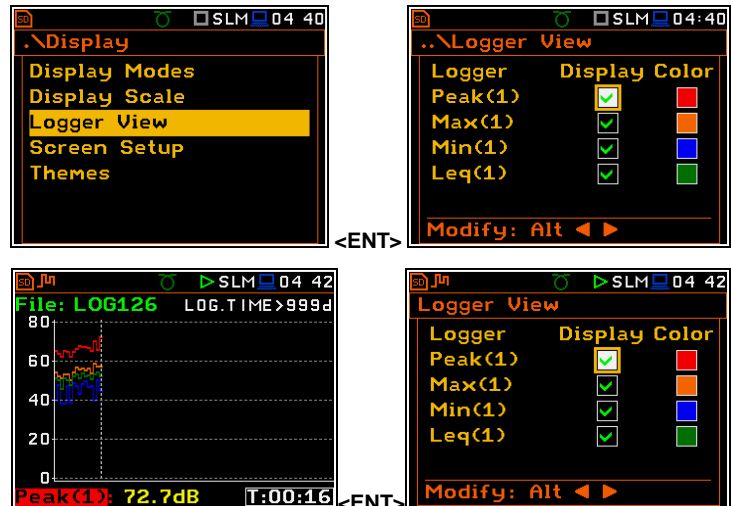
### Switching the automatic Y-scale adjustment on/off

The **Autoscale** position switches on the automatic adjustment of the Y axis. The adjustment is performed once automatically after the start of the measurement to suit the initial level of the input signal from the microphone or accelerometer.



## 6.3 Setting the parameters of the logger files presentation - Logger View

The **Logger View** position enables the user to change the colour of the curves for graphical presentation of the results which are saved in the logger file.



The view of the logger screen can be adjusted quickly without stopping the measurement. Highlight the function label in the bottom left hand corner then press the **<ENTER>** push-button and the **Logger View** list is displayed. The user may make necessary adjustments and return to the **Logger** view after confirmation of the performed changes by means of the **<ENTER>** push-button.

## 6.4 Setting the display brightness and power saver- Screen

The **Screen Setup** window enables the user to set the brightness of the display and to switch on the screen saver mode to save battery power.

### Setting the brightness of the display

The **Brightness** position enables the user to set the proper brightness of the display by means of the **<←>**, **<→>** push-buttons. The user can select 20 different values of this parameter. The new value of the brightness level is shown on screen after each press of the **<←>** or **<→>** push-buttons.

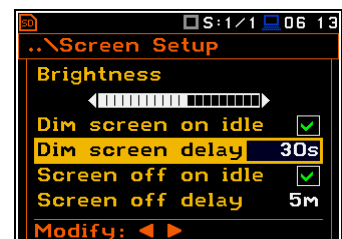
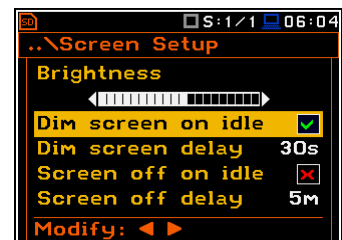
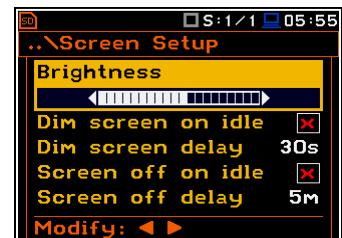
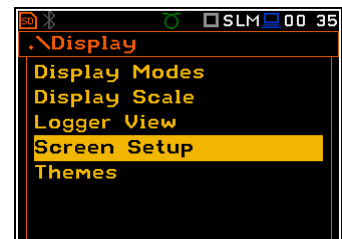
### Setting the power saver function

Saving the internal source of the instrument's power can be achieved by reducing the brightness of the screen whenever possible.

There are two options for the power saver function. The screen may be switched off (**Screen off on idle**) and/or dimmed (**Dim screen on idle**). When either of these options is set, after a delay, set by the parameters **Dim screen delay** or **Screen off delay**, from pressing any push-button the screen is dimmed or switched off. If it happens while in use, the first press of any push-button will cause the screen to switch back on again.

### Setting the power saver delay

The power saver delay defines the delay period from last use of any push-button to the power saver mode. This delay period can be set for **Dim screen on idle** from 5 s to 60 s and for **Screen off on idle** from 1 m to 60 m. The **<ENTER>** push-button must be pressed for confirmation of the selection, which then also closes the **Screen Setup** window. Press **<Esc>** to exit the **Screen Setup** window without changing the settings.



6.5 Setting the colour theme of the display – Themes

The **Themes** window enables the user to set the colour theme of the display

It is possible to choose between **Solar** and **Forest** themes. Solar theme is presented in this Manual. Forest theme is presented below.

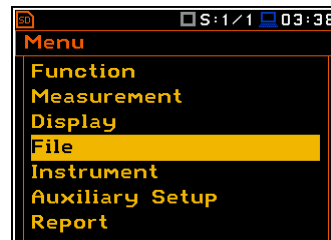
The default colour themes (Solar and Forest) are optimised to decrease the energy consumption of the OLED display.



## 7. SAVING THE MEASUREMENT RESULTS – File

The **File** list contains the elements that enable the user to manage the data files, created and saved in the internal memory of the instrument or in the external memory media (micro SD card or USB carriers).

Recording the measurement results is an essential task for the efficient use of the instrument. All available measurement results and also the instrument's settings are stored as a file in the internal FLASH type memory of the instrument or on the external memory – micro **SD Card** or **USB Disk**.



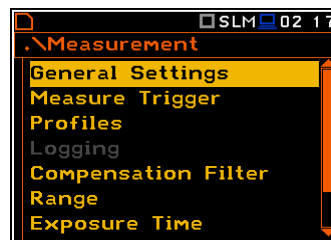
Instrument's files contain data:

- measurement results from **Sound Level Meter**;
- measurement results from **Vibration Level Meter**;
- measurement results from **1/1 Octave** analysis;
- measurement results from **1/3 Octave** analysis;
- measurement results from **FFT** analysis;
- results (measurement time history, event and marker recording), stored in the logger file;
- time waveform recording;
- measurement configuration setups.

The detailed description of all types of file structures is given in the Appendix B.



**Notice:** Because of limited internal memory capacity of the instrument's FLASH memory the logger and wave files can only be saved on the external memory. So, if there is no **SD Card** or **USB Disk** connected to the instrument then there is no possibility to create logger files. In such cases the **Logging** position in the **Measurement** list is not active. The **Logging** position also becomes inactive if the internal memory was set as the working directory (see below).



Result files can be saved manually and automatically, Setup files are saved manually and Logger files are always saved automatically as long as there is a micro SD card or a USB memory attached to the meter.

Each file consists of certain elements which are the same for all kinds of files:

- a file header;
- the unit and firmware specification;
- the user's text stored together with the measurement data;
- the parameters and global settings;
- the special settings for profiles;
- the marker of the end of the file.

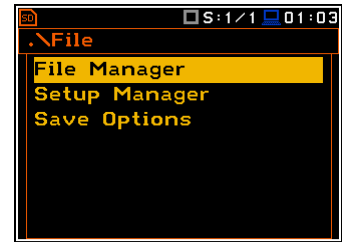
Other elements of the file structure depend on the type of the file (**SLM**, **VLM**, **1/1 Octave** -, **1/12 Octave**-, logger) and on the setting of **Save Statistics** (path: <Menu> / File / Save Options / Save Statistics). These elements are as follows:

- the main results;
- the results coming from **1/1 Octave - 1/12 Octave** analysis;
- the results coming from **FFT** analysis;
- the statistics header;
- the results of statistical analysis;
- the header of the statistical analysis performed in **1/1 Octave - 1/12 Octave** analysis;
- the results of the statistical analysis performed in **1/1 Octave - 1/12 Octave** analysis;
- the header of the file from the logger;
- the data stored during the measurement in the logger's file.



The **File** list contains the following items:

- |                      |   |
|----------------------|---|
| <b>File Manager</b>  | enables the user to manage the files saved in the instrument's or on the external memory; |
| <b>Setup Manager</b> | enables the user to manage the Setup files;   |
| <b>Save Options</b>  | enables the user to set the options of the measurement result savings.                    |

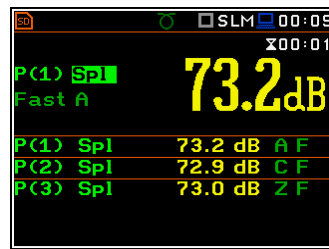


## 7.1 Saving files - Save and Save Next

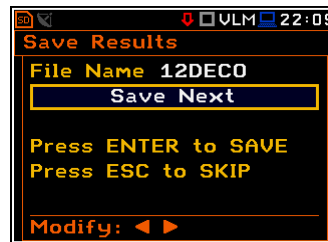
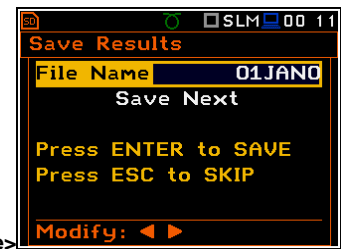
There are two options for storing result data in the internal or external memory. One option is to press the **<Save>** push-button right after the measurement has finished. Another option is to create **<New File>** in the **File Manager** window.

After pressing the **<Save>** push-button the **Save Results** window appears.

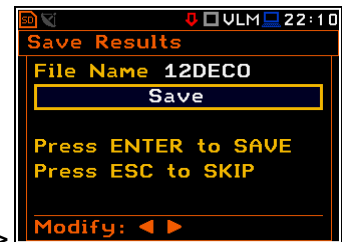
There are two available functions: save a file with the number in the file name increased by one every time the new data are stored (**Save Next**), or save a file with the edited name (**Save**). These functions are choosing by means of the **<Left>**, **<Right>** push-buttons.



<Save>



<Right>



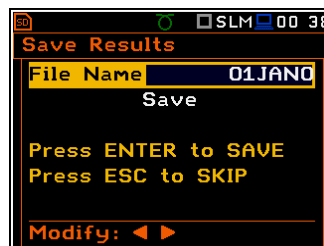
The name of the file, in which the measurements results are to be saved, is displayed above the **Save** or **Save Next** text. The default name for a file is displayed when first entering this position (after power on). The default name consists of the day and the month's abbreviation. The name is a combination of ASCII characters and cannot exceed eight characters.

The user can skip editing the file's name and immediately start saving the file by simply pressing the **<ENTER>** push-button or return to the **File** list by pressing **<ESC>**.

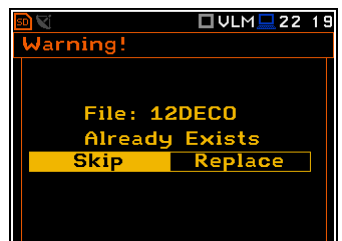
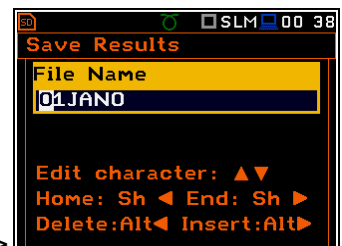
To start editing the offered name the user has to select the **File Name** position and to press the **<Left>** or **<Right>** push-button. The window with the special editing function will open. The editing process is presented on the Figure shown here.

All changes made to the file name during editing are ignored after pressing the **<ESC>** push-button and the instrument returns to the **File** list.

The edited name is accepted and the instrument returns to the **Save Results** window after pressing the **<ENTER>** push-button. The second press of the **<ENTER>** push-button saves the file in the working directory. A special warning is displayed in case the file with the edited name already exists in the memory. The instrument then waits for a reaction from the user (any push-button should be pressed except the **<Shift>** or the **<Alt>** one).

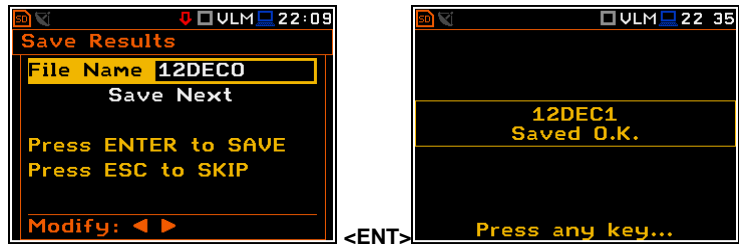


<Left>





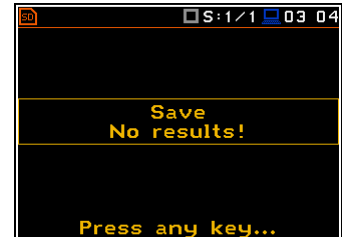
The simplified editing exists by the addition of the next integer number at the end of the file. The number is automatically increased by one. At the next attempt of saving a new data file, the new name is displayed in the **File Name** line and that name is increased by one again during the saving operation.



The number can be changed from 0 to N. The only limitation of the N value is the length of the file name, which cannot be longer than eight characters. When such limitation is achieved and the instrument cannot automatically change the file's name the only possibility is to select a new file name.

Saving is not possible when the instrument is measuring the signal. The message "Measurement in progress!" is displayed for about 3 seconds.

When no measurements were performed and there are no results to be saved the special message is displayed as shown here.



**Notice:** Direct access to the **Save / Save Next** function is possible after simultaneously pressing the **<ENTER>** and **<Alt>** push-buttons if the **Direct Save** option is switched off (path: **<Menu> / File / Save Options / Direct Save**). In the other case, (**Direct Save** option is switched on) the results are saved, after pressing the **<ENTER>** and **<Alt>** push-buttons, in the file with the automatically incremented name.



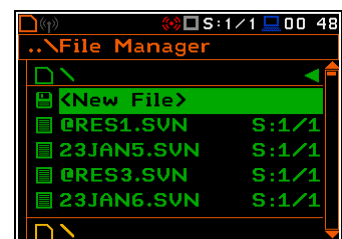
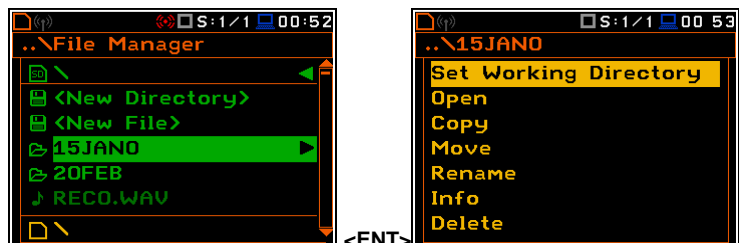
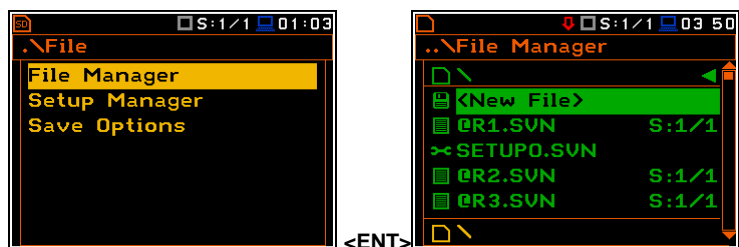
**Notice:** After the usage of the **<ENTER>** and **<Alt>** push-buttons (if the **Direct Save** option is switched on) the measurement results are saved only once. The following pressing will not cause any instrument's reaction unless next measurement is performed. The same result can be saved in multiple numbers of files only by using the **Save / Save Next** function.

## 7.2 Managing the files saved in the internal and external memory – File Manager

The **File Manager** is used for checking the contents of the memory and performing operations on result and logger files such as: open, delete, copy, move, rename, create new files (data files) or catalogues (directories) and display useful file and catalogue information.

The **File Manager** window consists of the list of files, catalogues and memory devices. Files are stored in catalogues, which are organised hierarchically. Catalogue names are of capital letters and have no extensions. By pressing the **<ENTER>** push-button the window with the list of available operations is opened at the marked (highlighted) position.

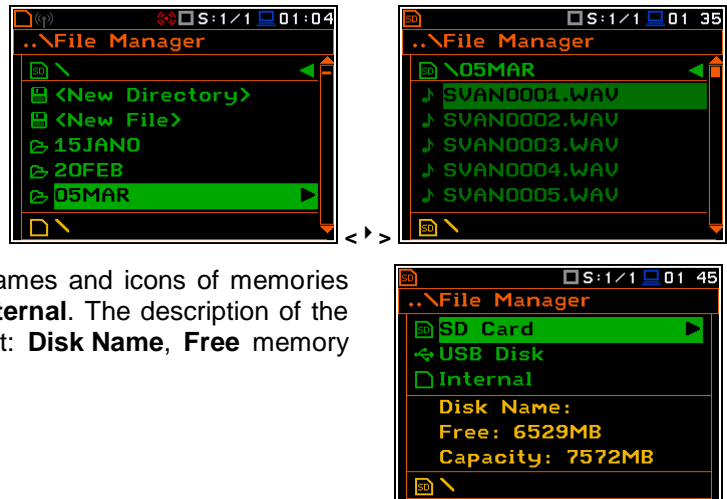
When **SD Card** or **USB Disk** is selected the first two positions **<New Directory>** and **<New File>** can be used to create new elements for the forthcoming measurements to enable the user to create a suitable structure to hold their sets of measurements in a logical manner. When **Internal** memory is selected the only the **<New File>** position is available.



When the memory or catalogue is marked (highlighted) then the right arrow icon appears at right side of the line. After pressing the <→> push-button the marked memory or catalogue is opened.

To return to the upper (previous) catalogue the user has to press the <←> push-button.

The upper (highest) catalogue contains the names and icons of memories available for files: **SD Card**, **USB Disk** and **Internal**. The description of the memory is presented below the memories list: **Disk Name**, **Free** memory and **Capacity** (total memory space).



In the **File Manager** window data files are described by their file name with an extension (**SVN** or **WAV**) as well as additional icon and measurement abbreviation (**SLM**, **S:1/1** etc.). The names in which the first character is @ come from the **Auto Save** function. The table with the description of icons is presented here.



Catalogue



Logger file



Wave file



Result file



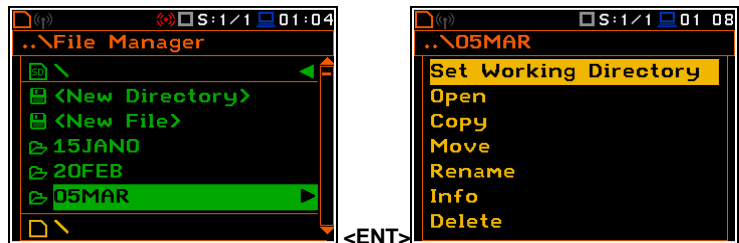
Setup file



New file or catalogue

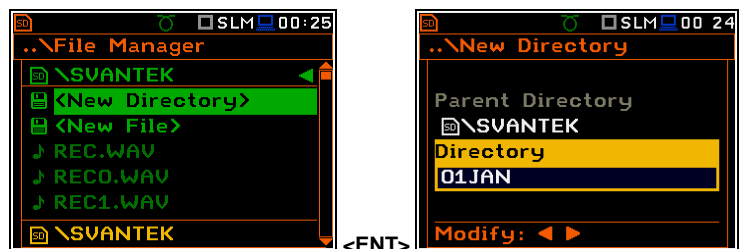
### 7.2.1 Setting the directory for saving files – Set Working Directory

It is possible to assign the default catalogue for automatically saving logger files and result files. To do this the user should choose the required catalogue and press the <ENTER> push-button. After opening the list of operations select **Set Working Directory** and press the <ENTER> push-button. The new catalogue name will appear at the bottom line of the display. Starting from this moment all future measurement files will be saved in this specified catalogue.

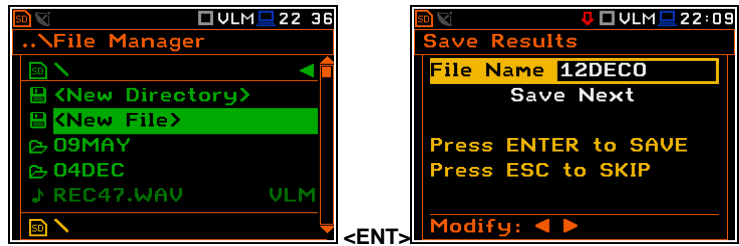


### 7.2.2 Creating new catalogue and new file

It is possible to create a new catalogue in the file system on the **SD Card** or **USB Disk**. To do this the user should select the catalogue in which the new one will be created and press the <ENTER> push-button at the <New Directory> position. A new catalogue name will be offered and appear at the bottom line of the display. If a directory already exists with the same name a warning message will appear. Otherwise this operation will be performed.

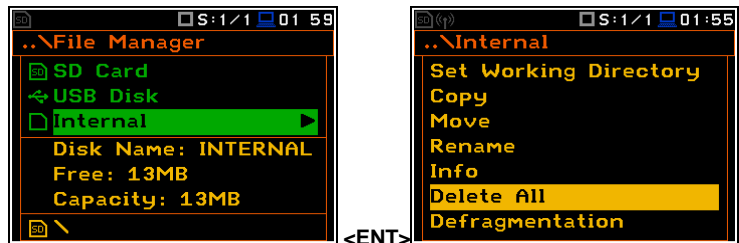


Saving results can be done also in the **File Manager** window by creating a new file in the file system. To perform this function the user should enter the catalogue in which the new file will be created and press the **<ENTER>** push-button at the **<New File>** position.

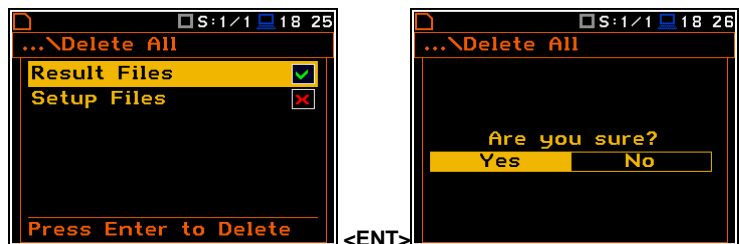


### 7.2.3 Deleting all files from Internal memory – Delete All

It is possible to delete all result and/or setup files from the instrument's memory. To do this the user should select the memory type and press the **<ENTER>** push-button. After opening the list of operations select the **Delete All** position and press the **<ENTER>** push-button again.



To delete files from the **Internal** memory the user has to mark the desired file type then press the **<ENTER>** push-button. The **Delete All** window with the list of file types will be opened. The user will be asked to confirm the deletion of the selected file type. Select **Yes** then press **<ENTER>** to delete otherwise press **<ESC>** to continue without deletion.

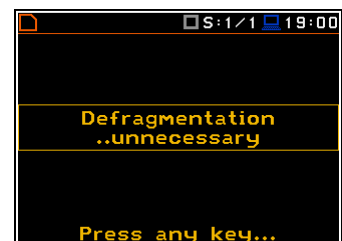
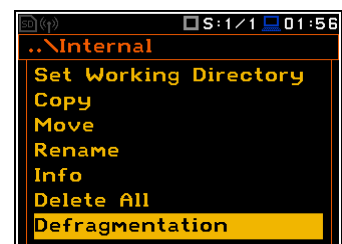


### 7.2.4 Defragmentation of the internal memory – Defragmentation

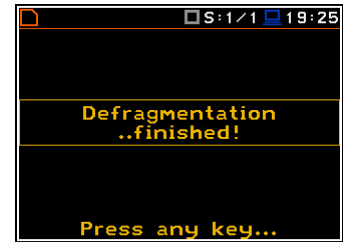
The **Defragmentation** option is used to make the **Internal** memory space contiguous. All new files are saved starting from the beginning of the free memory space. The memory occupied by the deleted file, assuming that the file was not the last one, remains unused for the next file saving process. After the removing a file the memory space becomes discontinuous, with unused parts, which will not be used in the future.

The situation changes after the process called defragmentation. During this process, the files saved in the files memory are moved in order to obtain the continuous occupied space and moving all the free space to the end of the memory.

After pressing the **<ENTER>** push-button on the active **Yes** option, the instrument checks whether the used result and setup files memory is continuous or not. If this memory is continuous, the **Defragmentation** operation is not executed and the special message is displayed. The instrument waits for the reaction of the user (any push-button should be pressed except **<Shift>** and **<Alt>**) and after pressing a push-button it returns to the **Defragmentation** sub-list.

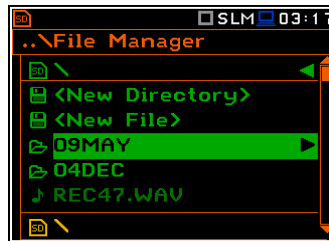


If there are valid conditions to execute the **Defragmentation** operation the current progress of defragmentation is shown on the display. After successful defragmentation, the special message is displayed and the instrument waits for the reaction of the user. Any push-button should be then pressed except **<Shift>** and **<Alt>**. After pressing a push-button, the instrument returns to the **Defragmentation** sub-list.

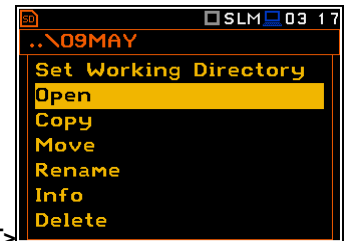


### 7.2.5 Opening file/catalogue – Open

It is possible to open any file or catalogue from the file/catalogue list. The user should select the file/catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Open** position and press **<ENTER>** again. The effect of such operation for the catalogue is the same as opening the catalogue by means of the **<▶>** push-button.



&lt;ENT&gt;



Opening the measurement file means that the measurement results saved in this file will be loaded to the instrument's operation memory and may be reviewed on the screen. The results are loading together with **Mode** and **Measurement Function** settings, but other measurement settings are as before opening the measurement file.



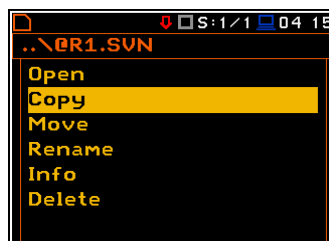
&lt;ENT&gt;



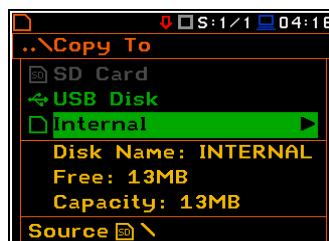
### 7.2.6 Copying file/catalogue – Copy

It is possible to copy a file or catalogue from the file/catalogue list in one memory type to another or from one catalogue of external memory to another catalogue in the same memory. It is not possible to copy logger files to the **Internal** memory since this type of memory does not accept such large files.

To perform this operation select the file/catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Copy** position and press the **<ENTER>** push-button again. The instrument then will propose to choose the target catalogue for copying. After selection of the target catalogue the user should press the **<ENTER>** push-button. The window with two options will appear: **Copy Here** and **Rename**.



&lt;ENT&gt;



&lt;ENT&gt;



### 7.2.7 Moving file/catalogue – Move

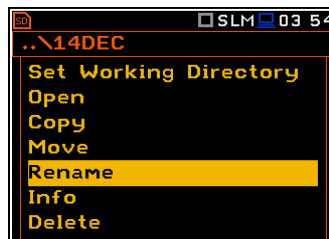
It is possible to move a file or catalogue from the file/catalogue list in one memory type to another or from one catalogue of external memory to another catalogue in the same memory (i.e. SD to SD or USB to USB). It is not possible to move logger files to the **Internal** memory since this type of memory does not accept such files.

To perform this operation select the file/catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Move** position and press the **<ENTER>** push-button again. The instrument will propose to choose the target catalogue for copying. After selection of the target catalogue press the **<ENTER>** push-button. The window with two options will appear: **Move Here** and **Rename**.

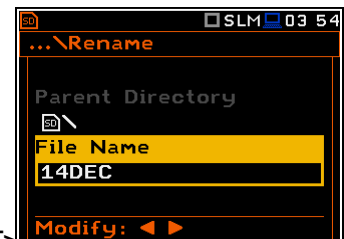


### 7.2.8 Renaming file/catalogue – Rename

It is possible to rename a file or catalogue. In order to do this the user should select the file/catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Move** position and press the **<ENTER>** push-button again. The window with text editor function will appear.

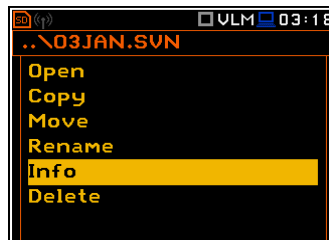


<ENT>

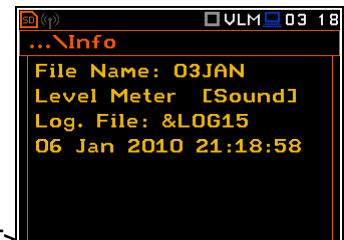


### 7.2.9 Information about file/catalogue – Info

It is possible to get information about a file or catalogue. The user should select the file/catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Info** position and press the **<ENTER>** push-button again. The instrument then will display the information about the selected file/catalogue.



<ENT>

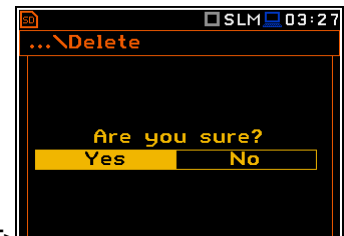


### 7.2.10 Deleting file/catalogue – Delete

It is possible to delete a file or catalogue from the file/catalogue list. The user should select the file/catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Delete** position and press the **<ENTER>** push-button again.




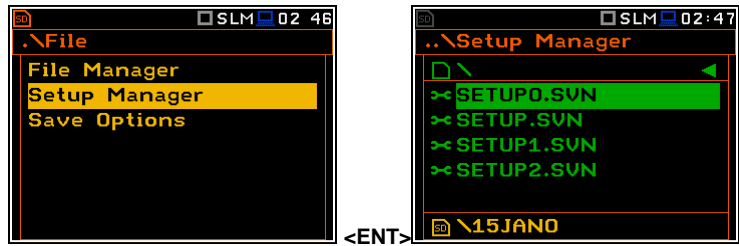
<ENT>



## 7.3 Managing the setup files – Setup Manager

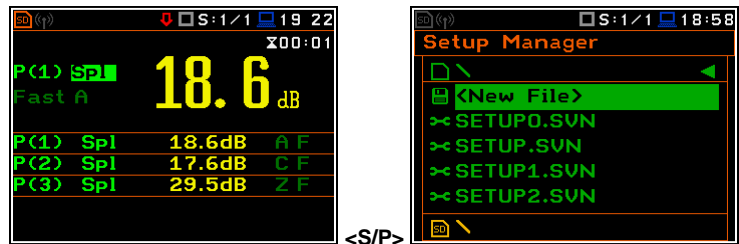
The **Setup Manager** is used for checking the contents of the memory and operating on Setup files such as: open, delete, copy, move, rename files, create new files and display file information.

In the **Setup Manager** window only setup files are displayed. Setup files have extension **SVN** and icon attribute .

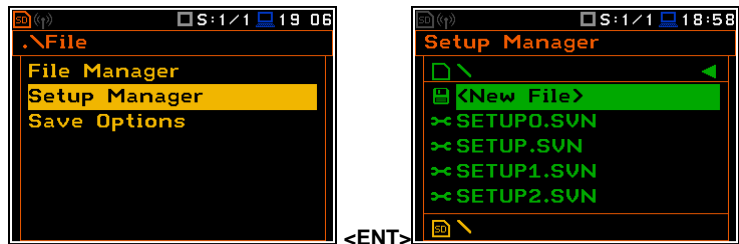


### 7.3.1 Saving the setup files

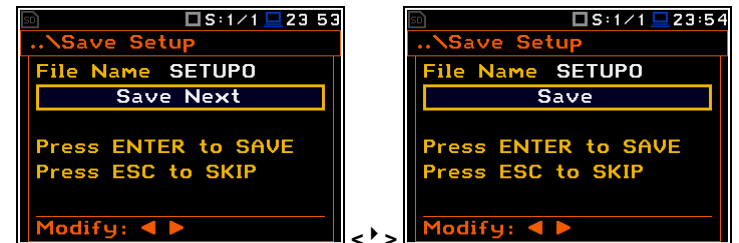
There are two options to open the **Setup Manager** window. One option is to press **<S/P>** push-button (**Alt + Esc**) when a measurement is not being performed. Another option is to open the **Setup Manager** position from the **File** menu.



In order to save the setup file the user should enter the catalogue in which the new file will be created and press the **<ENTER>** push-button at the **<New File>** position. **Save Setup** window is then opened.

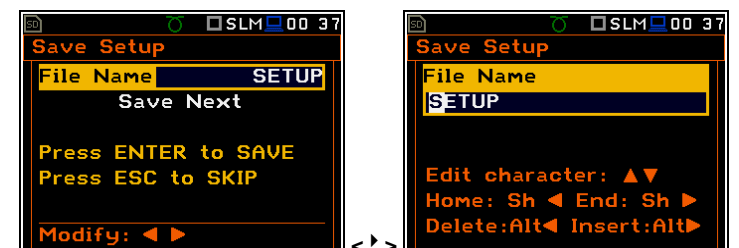


There are two available functions: saving a setup file with the name increased by one (**Save Next**), and— saving a setup file with an edited name (**Save**). The name can be chosen to indicate the purpose of the measurement configuration setup, e.g. TRAFFIC or WORK.



The editable name of the file, in which the setup settings are to be saved, is displayed in the **File Name** position. The default file name for Setup settings is **SETUP**.

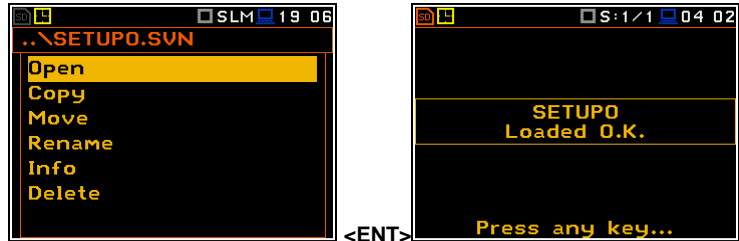
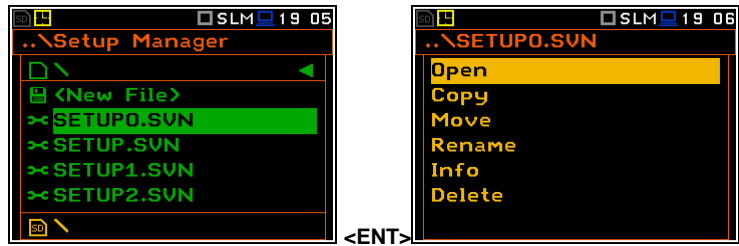
To edit the file name the user has to press the **< >** push-button. The text edition window is opening.



### 7.3.2 Operations on the setup files

The **Setup Manager** enables the user to perform operations on the setup files in the same way as it was described above for the **File Manager** position. To perform any of the operations like: **Open**, **Copy**, **Move**, **Rename**, **Info** and **Delete** the user should choose the file for which this operation will be applied and press the **<ENTER>** push-button. The list of operations then will open.

Opening the setup file means that the previously configured settings saved in this file will be loaded to the instrument's operation memory. So if the user presses the **<Start/Stop>** push-button the instrument will start the following measurement with the newly loaded settings.



To get information about the date and time the setup file was created the user should select the file and press the **<ENTER>** push-button. After opening the list of operations select the **Info** position and press the **<ENTER>** push-button again.

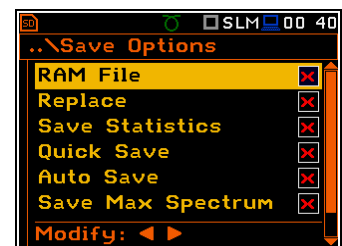


## 7.4 Controlling the data storing in the instrument's memory - Save Options

The **Save Options** sub-list is used for the selection of the options for storing measurement data sets in the instrument's file structure.

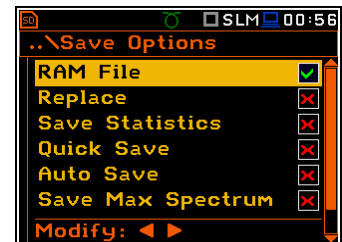


It is possible to write data into the same part of the memory starting all the time with the same address (**RAM File**), to replace the existing file in the memory by a new file with the same name (**Replace**), to add to the results the statistics of the measurements (**Save Statistics**), to save the results with the automatically incremented name (**Quick Save**), to save automatically the results of the measurements (**Auto Save**), to save the maximal values of the spectrum (**Save Max Spectrum**) and to save the minimal values of the spectrum (**Save Min Spectrum**).



### Saving data starting from the same address

The measurement data are usually saved in different files in the flash memory of the instrument. There is also the possibility to save data in the RAM file starting from the same address every time. It means that each time the data are saved the previous file is overwritten. This option is useful for permanent monitoring and remote reading data from the instrument by means of any available interface with the proper period (interval). In order to read data saved in a RAM file one has to use **#4,3** function described in details in App. A.



The **RAM File** functionality is available only in the **Level Meter, 1/1 Octave**

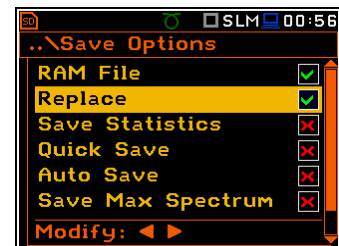


and **1/3 Octave** mode.

### Replacement of the existing files by the new ones

This option is used in remote mode and for the files created with the use of **Auto Save** function. The result of an attempt to save a file with a name, which already exists in the memory, depends on the setting of the **Replace** parameter. If the position is active then the old file will be erased and the new file will be saved with the same name.

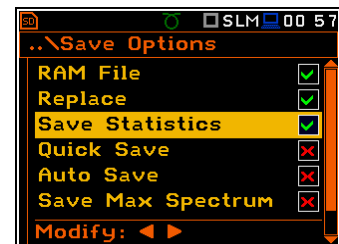
The message is displayed that such operation is not available in case this position is not active – cf. the description of the **Save**. Otherwise, the existing file is overwritten and will be lost.



### Measurement statistics saving

In parallel with main measurements 100 statistical values are calculated (the values named from **L01** to **L99**). The **Save Statistics** is used to set self saving, together with the measurement results, the complete statistics set of the measurements set by the **Integration Period** parameter.

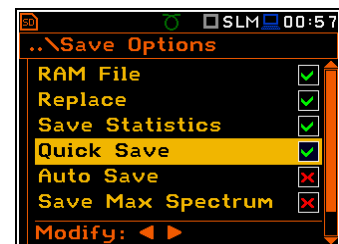
This function optimises the memory of the instrument. Each recording of the statistics set requires 600 bytes of the memory! Ten pre-defined selected statistical levels are always saved with the main results.



### Direct access to the Save / Save Next function

The **Quick Save** option enables the user to select the instrument's next operation after simultaneously pressing the **<ENTER>** and **<Alt>** push-buttons at the end of a measurement. If this option is not active, after pressing these push-buttons the Save window is accessed (if the measurements are not performed). If the option is active, after pressing the **<ENTER>** and **<Alt>** push-buttons the results are saved in the file with the automatically incremented name.

Pressing the **<ENTER>** and **<Alt>** push-buttons during the execution of a measurement causes, disregarding the option set in the **Quick Save** position, the error message "Measurement in Progress" to be displayed.

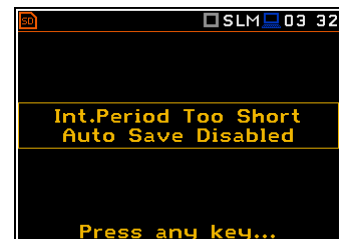
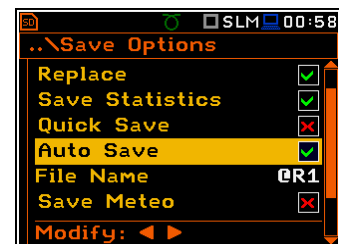


### Measurement results saving

Using the **Auto Save** the user can set the self-saving of the measurement results. This function optimises the memory of the instrument when the self-saving is not necessary and is useful for on-going regular measurements.

The **Auto Save** function can be performed only in case when the **Integration Period** value (path: <Menu> / Measurement / General Settings) is not less than 10 seconds. If it is less than 10 seconds, the measurement results are not saved and this is indicated with an error message! There is only one exception - when the **Repetition Cycles** number (path: <Menu> / Measurement / General Settings) is equal to one, the **Auto Save** function is executed disregarding the value of the integration period.

When the integration period is too short for the **Auto Save** option the following message appears on the display.

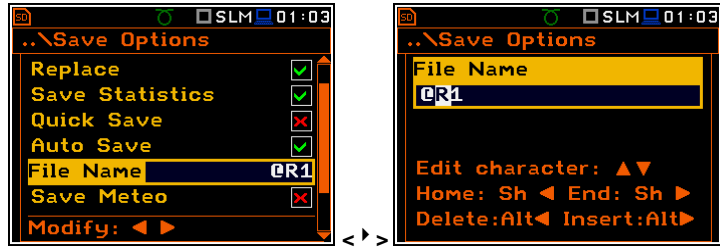




### Edition the name of the Auto Save file

The **File Name** position appears after switching on the **Auto Save** function and enables the user to edit the name of the Auto Save file.

To edit the file name the user has to press the **<P>** push-button. The text editing window is opened.



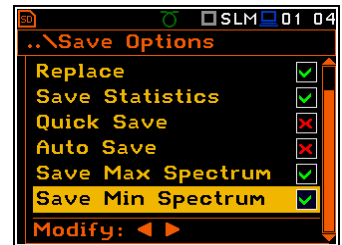
When the **Auto Save** option is active, after starting the measurements by pressing the **<Start/Stop>** push-button the results are saved in the file with the selected name.

Another measurement is started after next pressing of the **<Start/Stop>** push-button again. The measurement is stopped after the selected **Integration Period** (path: **<Menu>** / **Measurement** / **General Settings** / **Integration Period**). The numbers of the next saved named files are automatically incremented by one. The same remarks are valid in this case as already stated in the description of the **Save Next** function. When the **Auto Save** option is selected it is also possible to automatically save Meteo results. For this purpose it is necessary to switch the **Save Meteo** option on.

### Saving maximum and minimum values in the spectrum

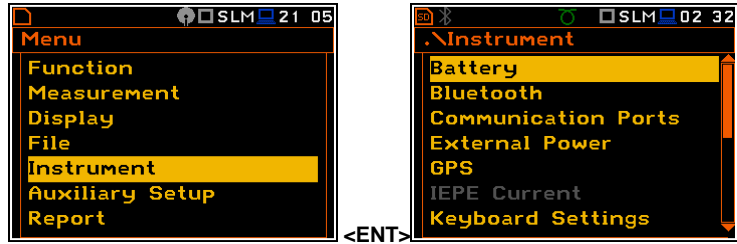
The **Save Max Spectrum** and **Save Min Spectrum** positions enable the user to save the highest and lowest values of the **Instantaneous** spectra (calculated with 100-milliseconds time step) in **1/1 Octave - 1/12 Octave** analysis, which occurred during the **Integration Period**, set in the **Measurement** list (path: **<Menu>** / **Measurement** / **General Settings** / **Integration Period**).

To see the **Max** or/and **Min** values on the display during the real time **1/1 Octave - 1/12 Octave** analysis measurement the user has to activate the option in the **Display** list (path: **<Menu>** / **Display** / **Spectrum View** / **Max and path: <Menu>** / **Display** / **Display Modes** / **Spectrum**: ☒).



## 8. SETTINGS THE INSTRUMENT PARAMETERS – Instrument

The **Instrument** list contains different sub-lists and positions, which are directly related to the settings of the hardware components of the instrument. In order to open the **Instrument** list the user has to press the **<Menu>** push-button, select the **Instrument** position and press **<ENTER>**.

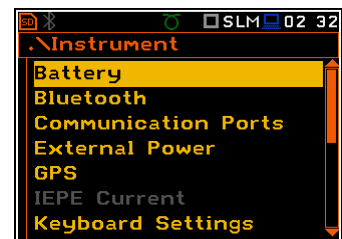


In the **Instrument** list, the following items are available:

<b>Battery</b>	enables the user to get information about current power source.
<b>Bluetooth</b>	enables the user to configure the Bluetooth operation for communication.
<b>Communication Ports</b>	enables the user to select the active port of the instrument.
<b>External Power</b>	enables the user to select the minimum voltage of the external source, when the instrument should be switched off automatically.
<b>GPS</b>	enables the user to select the time zone and switch on/off the time synchronization.
<b>IEPE Current</b>	enables the user to choose the correct IEPE current supply.
<b>Keyboard Settings</b>	enables the user to set the operating mode of the <b>&lt;Shift&gt;</b> and the <b>&lt;Start/Stop&gt;</b> push-buttons.
<b>Modem Status</b>	enables the user to check the status of the modem (position becomes active when the GPRS function is switched on).
<b>Multifunction I/O</b>	enables the user to select the available functionality of the I/O port.
<b>Polarisation Voltage</b>	enables the user to choose the polarisation voltage for the instrument's microphone.
<b>Remote Control Mode</b>	enables the user to configure the Remote Control mode.
<b>RS232</b>	enables the user to set the transmission speed and the timeout in the RS232 interface.
<b>RTC</b>	enables the user to set the Real Time Clock.
<b>Self Vibration</b>	enables the user to check the self vibration levels of the instrument.
<b>Signal Generator</b>	enables the user to switch on the signal generator function.
<b>Wireless Transfer</b>	enables the user to select the network type and set the parameters of the data transmission.
<b>Unit Label</b>	enables the user to check information about the type of the instrument, its serial number, the current firmware versions installed in it and the standards which the instrument complies with.

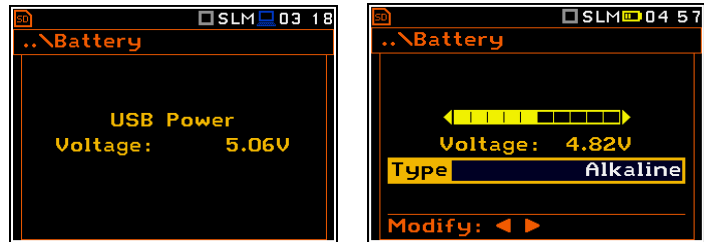
### 8.1. Checking the state of the internal battery – Battery

The **Battery position** enables the user to check the internal battery condition. The instrument can be powered from an external dc power supply, from the external battery pack, from four AA rechargeable or standard alkaline batteries or from the USB interface when its USB Device socket is connected by means of the cable to a PC or suitable USB power supply.



The view presented on the display for each of three kinds of possible power sources is different. The current battery voltage is displayed together with its approximate state (in graphical format).

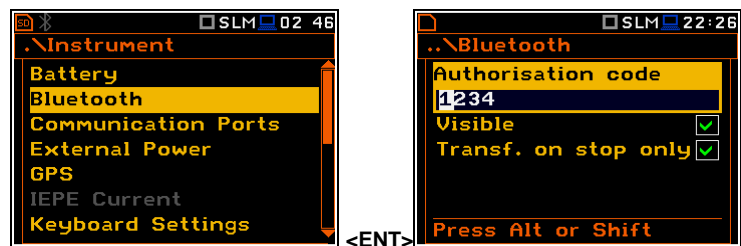
When the instrument is powered from a set of internal batteries the user should select the correct type. It is essential for the correct detection of the true capacity of the battery pack. Two types are available: **Alkaline** and **Rechargeable**.



## 8.2. Bluetooth activation – Bluetooth

The **Bluetooth** position enables the user to key in the authorisation code to pair a PC (or suitable tablet or smartphone) and the instrument.

If the **Visible** parameter is switched on then during the searching of the Bluetooth unit by the PC the instrument will be visible and it will be possible to pair the instrument and the PC. The instrument can communicate with the PC also with inactive **Visible** parameter.

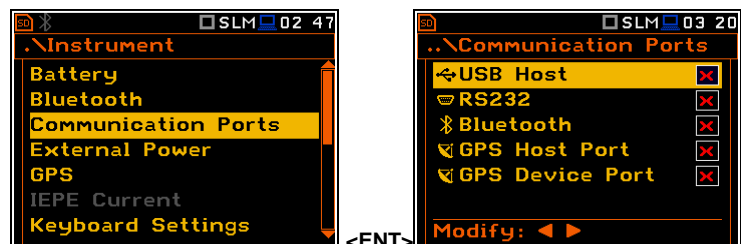


If **Transf. on stop only** is switched on then the Bluetooth function is switched off during the measurement. Active Bluetooth may be a source of additional internal electrical noise in very low acoustic environments.

## 8.3. Selection of the active port - Communication Ports

The **Communication Ports** position enables the user to select the active communication port of the instrument. It is possible to select the following combinations:

- **USB Host** / **Bluetooth** / **GPS Device Port**,
- **RS232** / **GPS Device Port**,
- **GPS Host Port** / **Bluetooth**.



The socket **USB Host** can be used as the input of the different interfaces: **RS 232** or **USB**. The **RS 232** interface in the **SVAN 97x** instrument is available as a hardware option (a special interface (**SV 55**) with a dedicated microprocessor has to be attached to the socket **USB Host**).



**Notice:** The converter **SV 55** serves as the RS 232 interface. The **SV 55** connection to the **USB Host** socket is detected and after successful detection the RS232 icon changes its colour to blue. Transmission with the **SV 55** interface is only possible if the instrument is not connected to a PC with the **USB Device** port.

The USB host interface can be used to control the external USB memory disk with the FAT16 or FAT32 file systems. After USB disc connection the user must switch on the **USB Host** position for correct operation.

The USB disk can be disconnected when the measurements are not performed or working directory was set up to **Internal** memory or **SD card**.

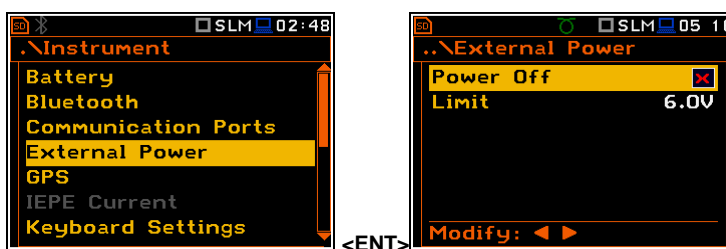
In the USB disk that is divided into partitions its first partition has to be reserved for FAT32 or FAT16 file system. Only short file names (up to 8 characters, similar to DOS system) may be used. The existing longer names are shortened automatically.



**Notice:** Disconnection of the USB disk during the data transmission can cause the loss of data saved in the USB disk as well as in the instrument's internal flash and should be avoided.

## 8.4. Setting the external power parameters - External Power

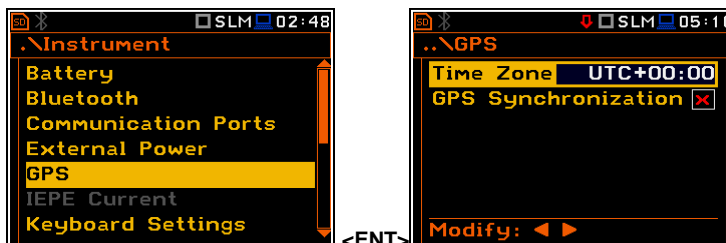
The **External Power** position enables the user to select the minimum voltage of the external dc power source (**SA 15/33**), when the instrument should be switched off automatically. This window appears automatically after switching on the instrument when the instrument is connected to the external dc power source (**SA 15/33**).



## 8.5. Setting the GPS parameters – GPS

The **GPS** position enables the user to select the time zone and switch the time synchronization on or off.

The **Time Zone** selection is made by means of the '<|>', '<|>' push-buttons.

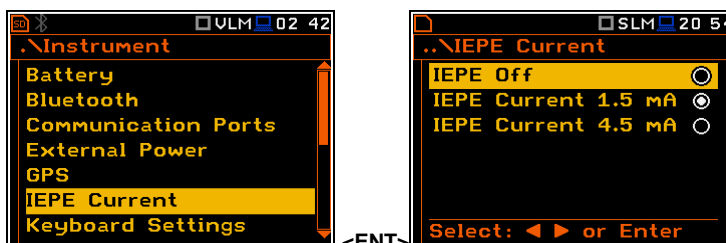


## 8.6. Selection of the IEPE current supply - IEPE Current

The **IEPE Current** position enables the user to choose the correct IEPE current supply.

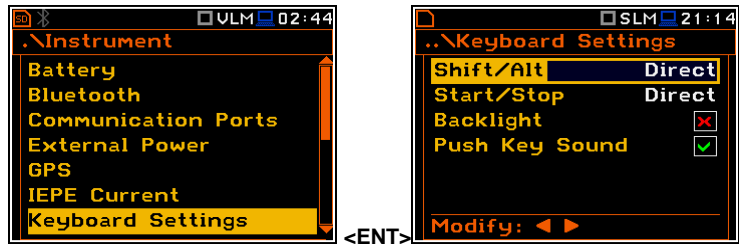
In addition to selecting **IEPE Off** two further options are available: **1.5 mA** and **4.5 mA**

Select the appropriate IEPE current supply to most closely match the requirements of the connected input source.



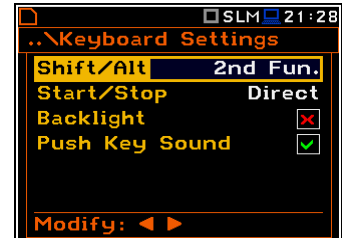
## 8.7. Selection of keyboard modes – Keyboard Settings

The **Keyboard Settings** position enables the user to programme the operational mode of the **<Shift>**, **<Alt>** and **<Start/Stop>** push-buttons and switch backlight and sound options on or off. The default settings are **Direct** for both items shown on the display screen.



#### **<Shift> / <Alt> push-button mode**

In the **Shift/Alt** position the user can choose between **2nd Fun.** and **Direct**. When the **Direct** option is selected, the **<Shift>** and **<Alt>** push-buttons operate as in the keyboard of a computer – in order to achieve the desired result, the second push-button has to be pressed at the same time as **<Shift>/<Alt>**. When the **2nd Fun.** option is selected the **<Shift>/<Alt>** push-button operate in sequence with the other one. This enables the user to use only one hand to operate the instrument.



#### **<Start/Stop> push-button working mode selection**

In the **Start/Stop** position the user can choose between **Direct** and **With Shift**. When the **Direct** option is selected the instrument reacts on each of the **<Start/Stop>** push-button press, starting or stopping the measurements.

When the **With Shift** option is selected the **<Start/Stop>** push-button operates at the same time as or in a sequence with **<Shift>**. The measurements are started or stopped after pressing both push-buttons.



#### **Backlight mode selection**

In the **Backlight** position the user can switch keyboard backlight on or off.

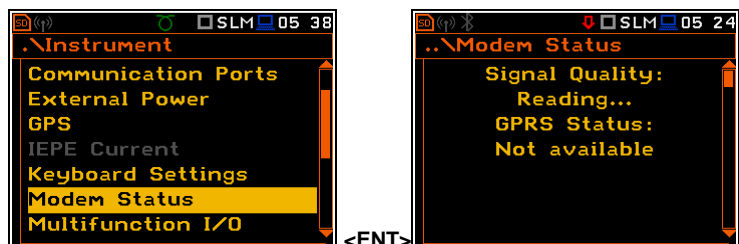
#### **Sound mode selection**

In the **Push Key Sound** position the user can switch keyboard sound on or off. During the actual measurement the key sound is not active even if it was switched on in the **Keyboard Settings** window.



## **8.8. Checking the modem status – Modem Status**

The **Modem Status** position is active only when the GPRS function is switched on (path: **<Menu>** / **Instrument** / **Wireless Transfer** / **Network** / **GPRS: on**). It enables the user to check the status of the modem.

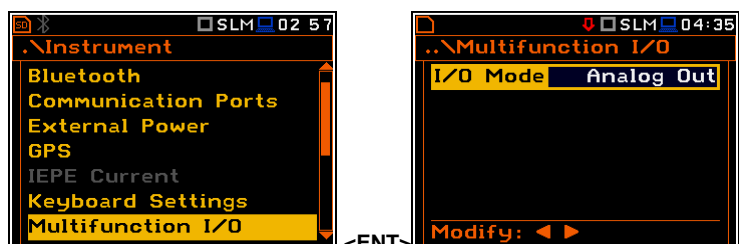


## **8.9. Setting parameters of the I/O port - Multifunction I/O**

The **Multifunction I/O** enables the user to select the available functionality of the **I/O** port.

#### **Selection of the mode of I/O port**

In the **I/O Mode**, it is possible to select the function of the instrument's 2 pin Lemo



socket named as **I/O**.

The **I/O** jack socket can be used as:

- the output of the analogue signal (**Analog Out**) transmitted from the input of the instrument to its output without any digital processing (i.e. frequency filtering),
- the input of the digital signal used as an external trigger to start the measurements (**Digital In**) in the instrument, acting in this case as a so called “slave instrument”,
- the digital output (**Digital Out**) used for triggering other “slave instrument(s)” (the instrument is acting in this case as a “master instrument”), or as a source of any alarm signal in case of certain circumstances occurred during the measurements (i.e. the level of the input signal was higher than a user selected trigger alarm setting).

The more detailed description of the **I/O** socket is given in App. C.

### Slope parameter selection for the Digital In mode (Trigger function)

In the case of **Digital In** selection the signal appearing on the **I/O** socket will be treated as the external trigger if **External** is chosen as a trigger (*path: <Menu> / Measurement / Trigger / Measure Trigger / Trigger / External*). For **Digital In** mode only the **Ext.Trigger** value is available for the parameter **Function**. It is possible to set up **Slope** as positive **[+]** or negative **[-]** by means of the **<◀**, **>▶** push-buttons.

### Digital output function selection of the I/O socket

The **Function** position enables the user to set the function of the digital output of the **I/O** instrument's socket. The socket can be used as the source of the trigger pulse (**Trig. Pulse**) which starts the measurement in another “slave instrument” linked to the “master instrument” or the alarm signal, which appears here after fulfilling certain measurement conditions (**Alarm Pulse**).

### Polarisation selection of the digital output signal

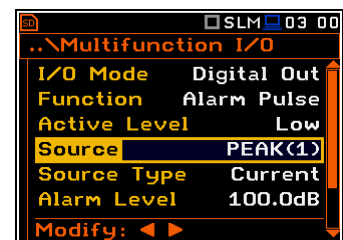
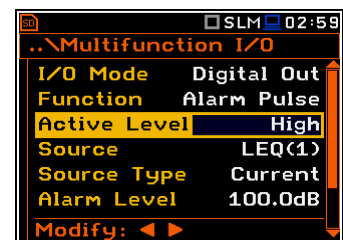
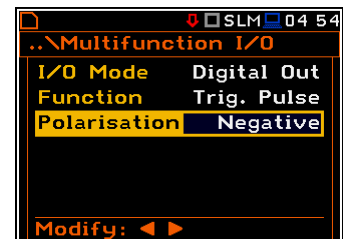
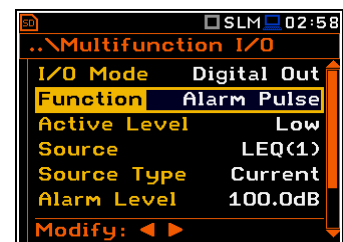
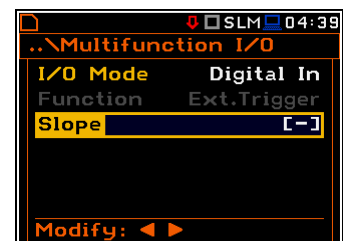
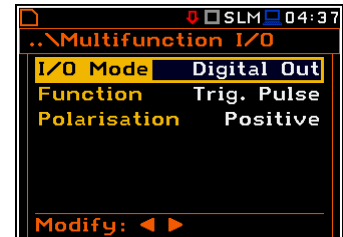
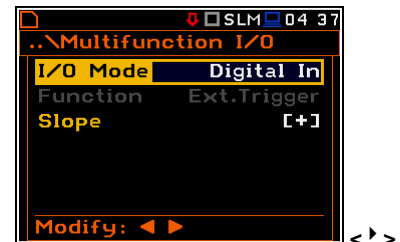
The **Polarisation** position enables the user to select which polarisation of the signal (negative or positive going) will be applied to the output signal.

### Active level selection of the digital output signal

The **Active Level** position enables the user to select which level of the signal should be treated as a valid one (“negative” or “positive” logic): **Low** or **High**.

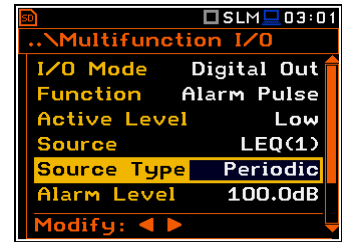
### Source signal selection for the alarm pulse generation

The **Source** position enables the user to select which measurement result level should be checked. If the measured result level is greater than selected alarm level, the instrument will generate alarm signal on the **I/O** socket. The measurement results from the first profile: **PEAK(1)**, **SPL(1)**, **Max(1)** or **LEQ(1)** can be used for the purpose described above.



### Selection of the alarm source type

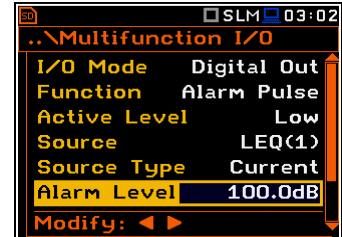
The **Source Type** position enables the user to select the type of alarm source. Available types are: **Current** and **Periodic**.



### Alarm level selection on the digital output of I/O

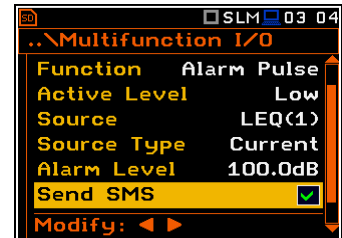
The **Alarm Level** enables the user to set the level of the result to be monitored during the measurements. If the result is greater than the one set in this line, the instrument will generate the alarm signal in the selected logic. The available levels are within the range [30.0 dB, 140 dB].

The **Alarm Level** current value can be decreased / increased by 0.1 dB by means of the <↑> / <↓> push-buttons. The step can be decreased / increased up to 1 dB after simultaneously pressing the <↑> / <↓> push-buttons together with <Shift>.



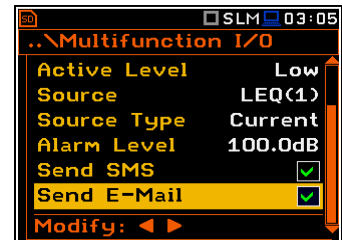
### Switch on or off the SMS message in case of alarm

When the alarm is generated during the measurement it is possible to send an SMS message to the phone number, defined in the **SMS Option** window (path: <Menu> / Instrument / Wireless Transfer / SMS Options).



### Switch on or off the E-mail message in case of alarm

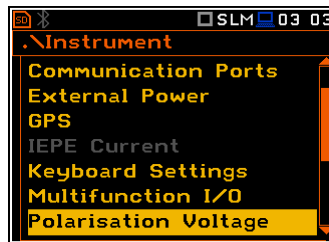
When the alarm is generated during the measurement it is possible to send an E-mail message to the address, defined in the **E-mail Settings** window (path: <Menu> / Instrument / Wireless Transfer / E-mail Settings).



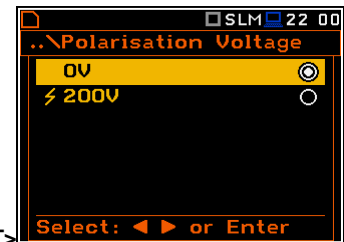
## 8.10. Setting the microphone polarisation voltage – Polarisation Voltage

The **Polarisation Voltage** position enables the user to choose polarisation voltage of the instrument's microphone.

Two options are available: **0V** and **200V**. The selection is made by marking the required position by means of the <↑>, <↓> push-buttons.



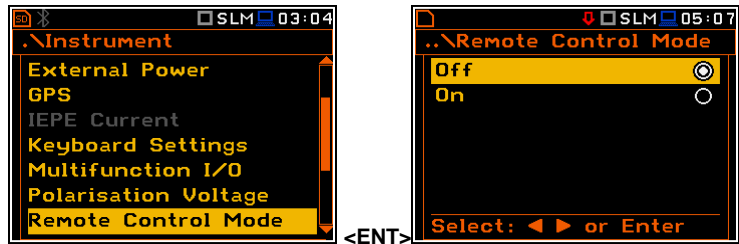
<ENT>



## 8.11. Remote control mode configuration – Remote Control Mode

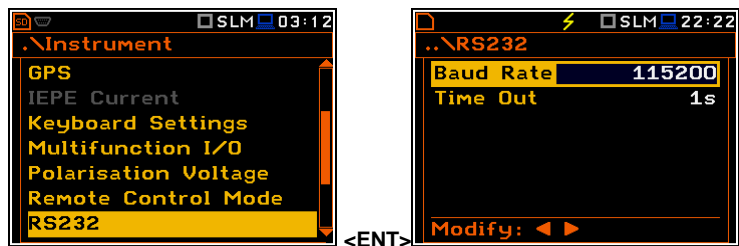


The **Remote Control Mode** position enables the user to activate the Remote Control mode. In this mode the messages that require manual action from the user will stop being shown after 5 seconds. This mode is helpful when the instrument is configured for remote monitoring during which there is usually nobody present who can control the instrument manually. By enabling the Remote Control mode, the instrument's normal operations will not be interrupted by displaying these messages.



## 8.12. Setting the parameters of the serial interface - RS232

The **RS232** position enables the user to programme the RS 232 interface transmission speed (**Baud Rate**) and to set the time limit during which the communication operation should be performed (**Time Out**).



### Setting the transmission speed of the serial interface

The RS 232 interface transmission (**Baud Rate**) speed can be selected from the following available values: **1200** (bits / second), **2400** (bits / s), **4800** (bits / s), **9600** (bits / s), **19200** (bits / s), **38000** (bits / s), **57600** (bits / s) or **115200** (bits / s). The selection is made by means of the <◀>, <▶> push-buttons. The setting here should be the same as in the connected instrument or computer to ensure successful data transfer.

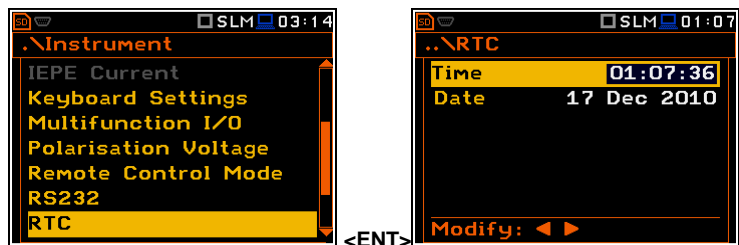
The other RS 232 transmission parameters are fixed to **8 bits for data, No parity & 1 Stop bit**.

### Setting time limit for the performance of serial interface operation

The default value of the parameter **Time Out** is equal to one second but this may be too short for some slower printers, which may not be fast enough. In such cases, the **Time Out** parameter may have to be increased to a higher value.

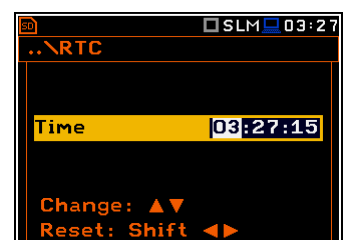
## 8.13. Programming the instrument's internal Real Time Clock – RTC

The **RTC** enables the user to programme the internal **Real Time Clock**. This clock is displayed in the different places depending on the selected presentation mode.



The required hour, minute and second can be selected in a special window, which is opened by means of the <◀>, <▶> push-buttons.

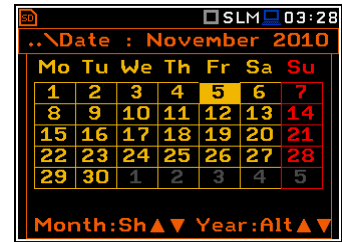
To set hours, minutes or seconds the user has to enter the correct field position by pressing the <◀>, <▶> push button and then selecting the correct value by means of the <▲>, <▼> push-buttons and then pressing the <ENTER> push-button to set and confirm the chosen value.






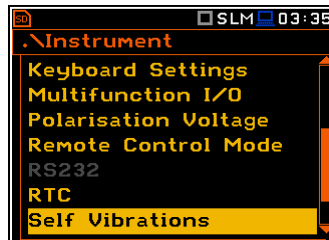
The required date can be selected in a special window, which is opened after pressing the <◀>, <▶> push-buttons when the **Date** text is displayed inversely in the **Timer** sub-list.

In order to set the correct date the user has to select its position by means of the <◀>, <▶> and <▲>, <▼> push buttons and then press the <ENTER> push-button to set and confirm the chosen value.

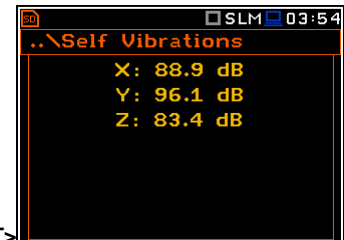


#### 8.14. Checking the instrument's vibration – Self Vibration

The **Self Vibration** position enables the user to check the self vibration levels of the instrument. The X direction is from side to side, the Y direction is from top to bottom and the Z direction is from front to back. The self vibration  indicator will flash momentarily at the top of the screen if the level in any direction exceeds 100 dB.

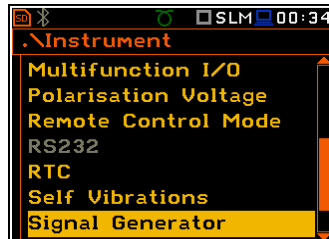


<ENT>

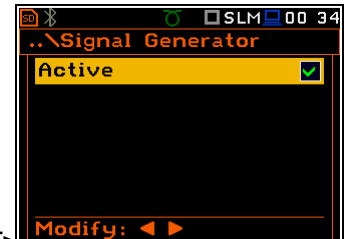


#### 8.15. Signal generator activation – Signal Generator

The **Signal Generator** position enables the user to switch on the signal generator function. The settings of the generated signal are made in the **Signal Generator** presentation mode (see **Display** menu description).

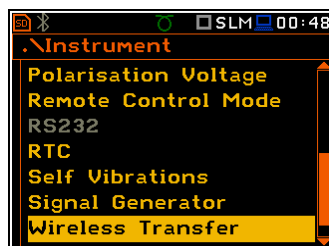


<ENT>

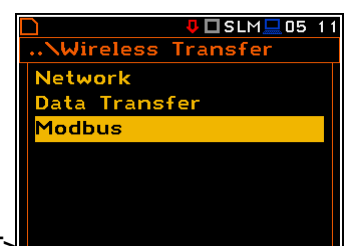


#### 8.16. Parameters of remote communication - Wireless Transfer

The **Wireless Transfer** position enables the user to select the network type and set the parameters of the data transmission.



<ENT>



##### 8.16.1. Selection of the network type – Network

It is possible to select one of three options: **Off**, **GPRS** and **Modbus**.

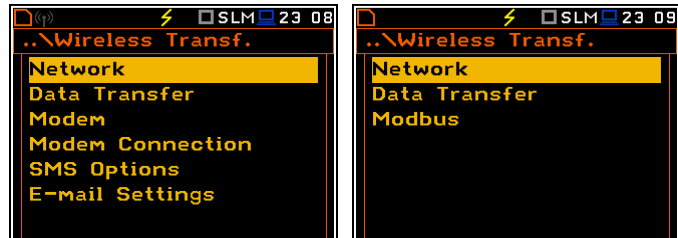
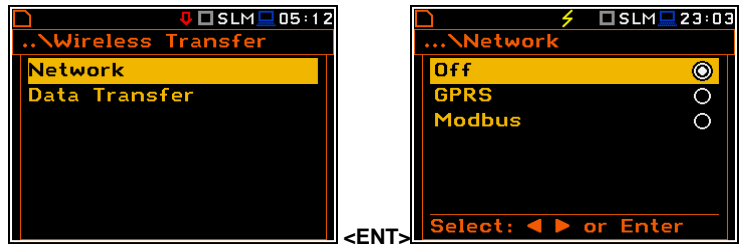
Depending on the settings in the **Network** list the **Wireless Transfer** screen has different sets of positions.

If the **Off** parameter was selected the **Network** window has two positions: **Network** and **Data Transfer**.

If the **GPRS** network was selected the **Wireless Transfer** window will have six positions: **Network**, **Data Transfer**, **Modem**, **Modem Connection**, **SMS Options** and **E-mail Settings**.

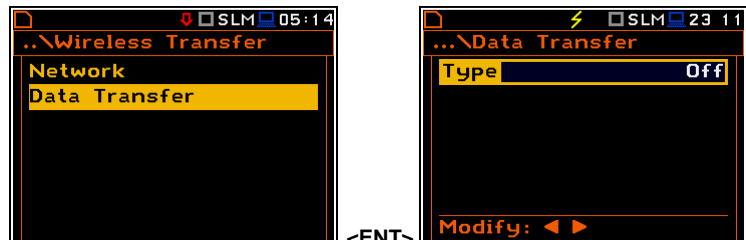
If the **Modbus** network was selected the **Wireless Transfer** window will have three positions: **Network**, **Data Transfer** and **Modbus**. Modbus protocol and its implementation in SVAN instruments is described in Appendix I.

Communication between modem and SVAN instruments is described in Appendix J.

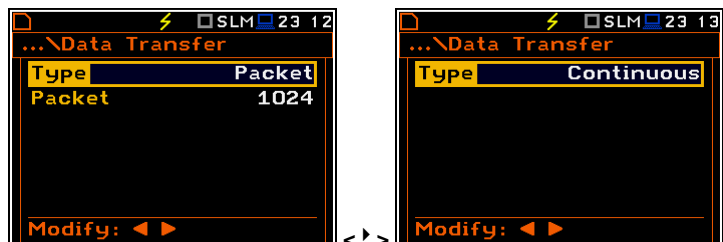


### 8.16.2. Selection of the data transfer type - Data

In the **Data Transfer** window the user can switch off or choose the data transfer type. The **Type** parameter enables the user to select the type of the **Wireless Transfer**. Three options are available: **Off**, **Continuous** and **Packet**.



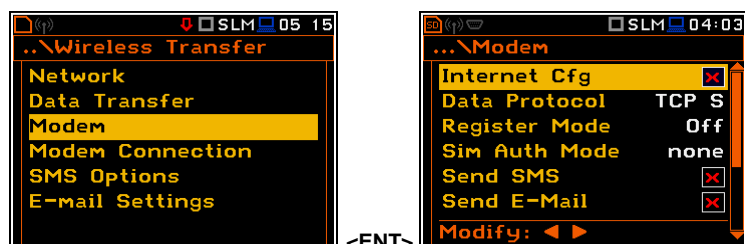
In the case of the **Packet** type it is possible to select the packet size in bits. The available options are **1024**, **512**, **256**, **128** and **64**.



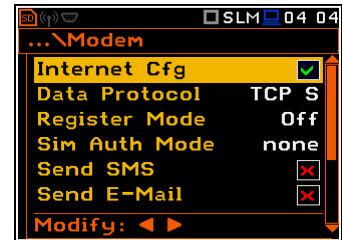
### 8.16.3. Configuration of modem basic settings – Modem

The **Modem** position enables the user to configure modem basic settings, such as modem type and connection types.

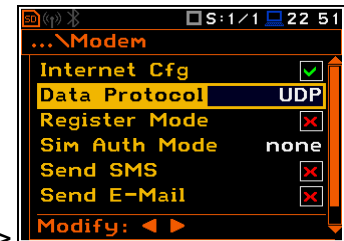
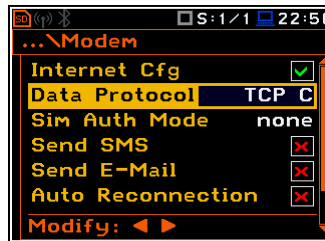
The **Modem** window contains the following options:



- **Internet Cfg** – selecting this option ensures that the device is set to automatically configure the modem. When the device is turned off with this option set, it will attempt to configure the modem after the next turn on. More about this option is written in Appendix J (Configuration and Registration).



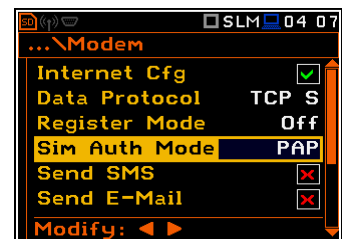
- **Data Protocol** – defines connection type for data exchange. Available types are **TCP S** (server mode), **TCP C** (client mode) and **UDP**.



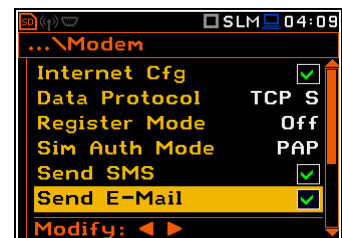
- **Register Mode** – selecting this option ensures that the device instantly attempts to register the station provided the modem is already configured. More about the registration is written in Appendix J (Configuration and Registration). Depending on selected **Data Protocol** type the values of this parameter are different. In case when **Data Protocol** type is **TCP S** the values of this parameter are: **Off**, **On** (registration using Connection Request Packets), **AS** (periodic registration on Svantek Server Address), **SMT.AS** (registration on Svantek Server Address – performed each time internet connection is initialized by the modem). In case when **Data Protocol** type is **TCP C** the **Register Mode** position does not appear. In the case when **Data Protocol** type is **UDP** the **Register Mode** is limited to **Off** and **On**.

- **Sim Auth Mode** – defines the method of user verification by the SIM card. Depending on the SIM card, several options are possible, some of them are recognized by the modem:

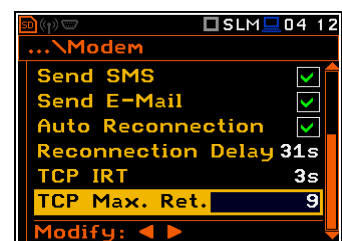
- **none** – no verification required.
- **PAP**
- **CHAP**
- **MsChap** – denotes MsChap in version 1.



- **Send SMS** – selecting this option will configure SMS service by the modem.
- **Send E-Mail** – selecting this option will configure e-mail service by the modem.

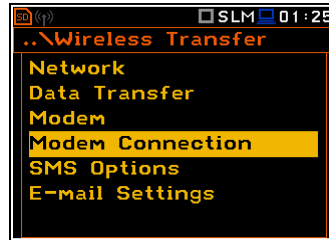


- **Auto Reconnection** – selecting this option will make the device attempt to reconnect the modem in the case of errors or sudden disconnection. More about this option is written in Appendix J (Error handling).
- **Reconnection Delay** – time between each reconnection attempt.
- **TCP IRT** - initial timeout for TCP connections. In some cases, extending this timeout may be helpful in case of slow connections, but the default setting is recommended.
- **TCP Max. Ret.** - maximum reconnection attempts performed within a simple connection cycle. In some cases, setting higher value may be helpful in case of slow connections, but the default setting is recommended.

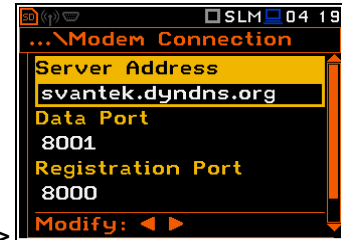


#### 8.16.4. Setting of support modem options - Modem Connection

The **Modem Connection** position enables the user to configure several supporting options required by SIEMENS modem to establish internet connection. More about this option is written in Appendix J (Configuration and Registration).

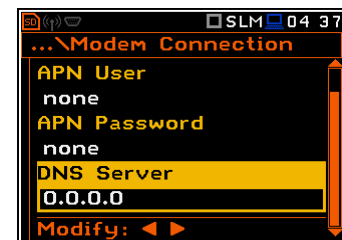
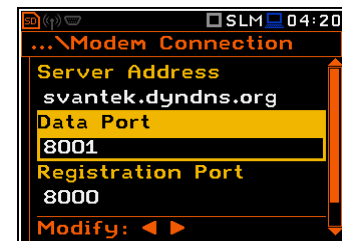
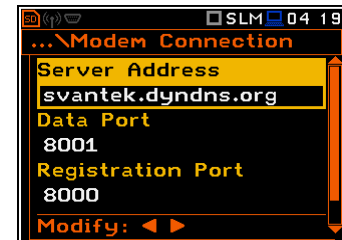


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The **Modem Connection** window contains the following positions:

- **Server Address** – allows the user to enter up to 32 characters of either IP or domain address, where the registration data will be sent during the registration process (**Data Protocol: TCP S** or **UDP**) or to which the modem will connect to (**Data Protocol: TCP C**).
- **Data Port** – allows the user to enter up to 5 characters for the port number. This number denotes a port on which a communication socket will be configured for data exchange between remote host and the station.
- **Registration Port** – allows the user to enter up to 5 characters for the port number. This number denotes a port on which a communication socket will be configured to transmit registration packet (Register Mode: On) or exchange Http data (Register Mode: AS or SMT. AS).
- **APN** – allows the user to enter up to 20 characters of APN name of the SIM card used with the modem.
- **APN User** – allows the user to enter up to 20 characters of user name used for verification by the SIM card used with the modem.
- **APN Password** – allows entering up to 20 characters of password used for verification by the SIM card used with the modem.
- **DNS Server** – allows the user to enter up to 15 characters of IP address of DNS server used for establishing connection with the internet. In most cases, leaving the default value of "0.0.0.0" will be sufficient, but some SIM cards may require a specific address to be entered.



Editing each position is performed in the special window with the text editor function, which is opened after pressing the <◀>, <▶> push-buttons.

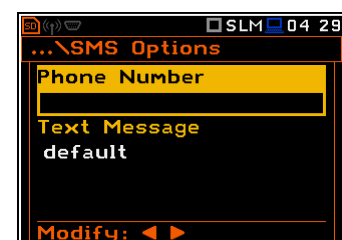
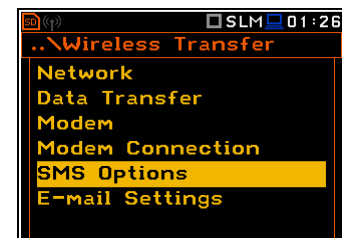
#### 8.16.5. Configuration of SMS service - SMS Option

The **SMS Options** position allows the user to configure SMS service used for alarm notification. For more information about alarm notification see Appendix J (Alarm notification).

The **SMS Options** window contains the following positions:

- **Phone Number** – allows the user to enter up to 20 characters of the phone number where the text messages will be sent.
- **Text Message** – allows the user to enter up to 20 characters of additional text, which will be appended into a standard alarm message template.

Editing each position is performing in the special window with the text editor function, which is opened after pressing the <◀>, <▶> push-buttons.

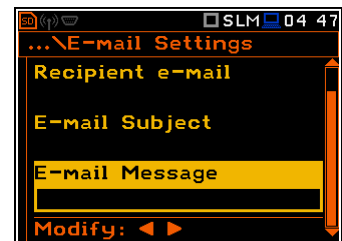
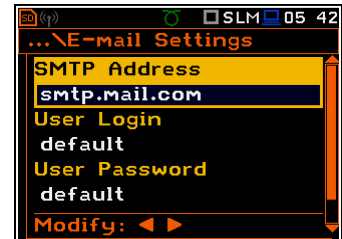
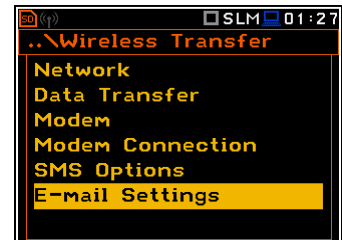


### 8.16.6. Configuration of e-mail service - E-mail

The **E-mail Settings** position allows the user to configure the e-mail service used for alarm notification. For more information about alarm notification see Appendix J (Alarm notification).

The **E-mail Settings** window contains the following positions:

- **SMTP Address** – allows the user to enter up to 32 characters of SMTP server address which will be used to send e-mail messages.
- **User Login** – allows the user to enter up to 20 characters of user login text used to establish verified connection with SMTP server.
- **User Password** – allows the user to enter up to 20 characters of user password text used to establish verified connection with SMPT server.
- **Sender e-mail** – allows the user to enter up to 48 characters of e-mail address from which the e-mail message will be sent.
- **Recipient e-mail** – allows the user to enter up to 48 characters of e-mail address to which the e-mail message will be sent.
- **E-mail Subject** – allows the user to enter up to 20 characters of the message's subject.
- **E-mail Message** – allows the user to enter up to 20 characters of additional text which will be appended to standard e-mail message template used for alarm notification.



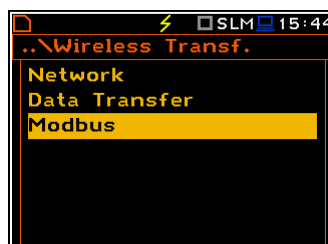
Editing each position is performing in the special window with the text editor function, which is opened after pressing the <◀>, <▶> push-buttons.

### 8.16.7. Data transfer with the Modbus protocol – Modbus

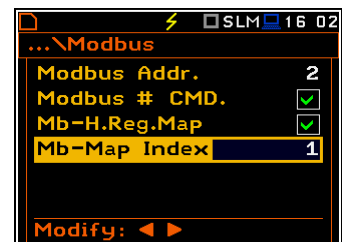
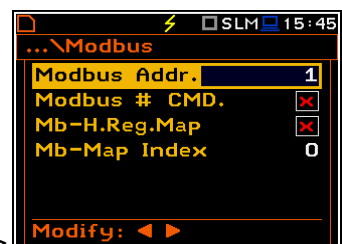
If the **Modbus** network was selected the **Wireless Transfer** window will have three positions: **Network**, **Data Transfer** and **Modbus**. Modbus protocol and its implementation in SVAN instruments are described in Appendix I.

The **Modbus** window contains the following positions:

- **Modbus Addr.** - device Modbus address, ranging from 1 to 247.
- **Modbus # CMD.** - selecting this option, enables processing of Svantek # functions via Modbus protocol. Upon entering a # command into Modbus structures, it will be processed and any results will be placed in Input Registers (and Discrete Inputs) structure. **It is not recommended to use this option alongside with Mb-H.Reg.Map option!**
- **Mb-H.Reg.Map** - selecting this option enables result mapping. During measurement, on-going results will be placed in Holding Registers starting from appointed address. **It is not recommended to use this option alongside with Modbus # CMD. option!**
- **Mb-Map Index** - denotes address from which result map will be placed during measurements.

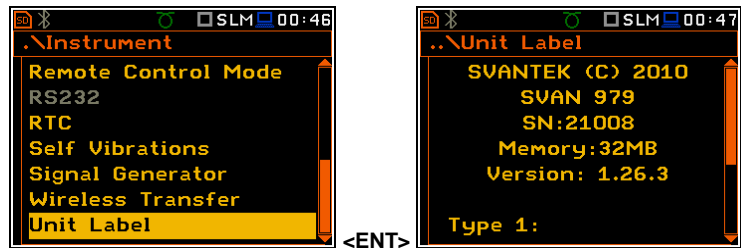


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## 8.17. Checking specification of the instrument - Unit Label

The **Unit Label** enables the user to check information about the model number of the instrument, its serial number, the current firmware version installed in it and the appropriate standards which the instrument complies with.



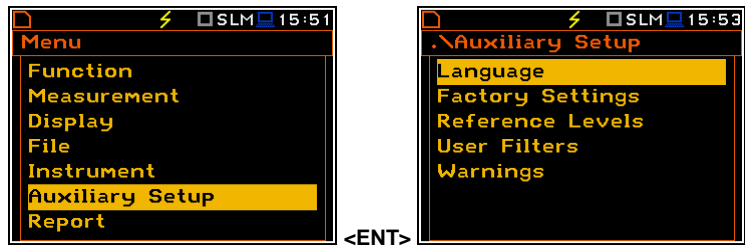
**Notice:** The contents of the **Unit Label** screen should always sent to Svantek's service department or official representative in case of any problems faced by the user during the instrument's normal operation in the field.

## 9. AUXILIARY SETTINGS – Auxiliary Setup

The **Auxiliary Setup** list contains positions directly related with sound or vibration measurements and not related to the hardware components of the instrument. In order to view the **Auxiliary Setup** list the user has to press the **<Menu>** push-button, select the **Auxiliary Setup** text and press **<ENTER>**.

In the **Auxiliary Setup** list, the following items are available:

<b>Language</b>	enables the user to select the language of the user interface.
<b>Factory Settings</b>	enables the user to return to the default, factory settings.
<b>Reference Levels</b>	enables the user to select the reference level for the Vibration measurements and it informs the user about the reference level in the Sound measurements.
<b>User Filters</b>	enables the user to select and set the correcting values for all real-time and the 1/1 - 1/12 octave filters.
<b>Vibration Units</b>	enables the user to select the Vibration units in which the results of the measurements are to be given. This position appears only in Vibration modes.
<b>Warnings</b>	enables the user to switch the warnings on or off that can be displayed during the normal operation of the instrument.

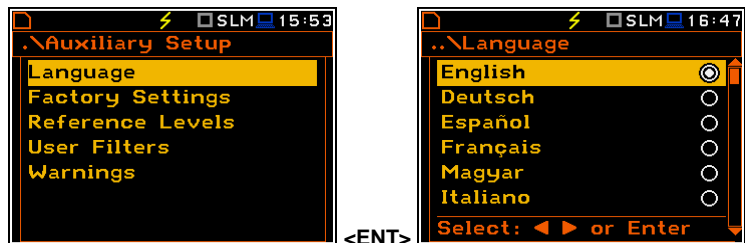


### 9.1. Setting the language of the user interface – Language

The **Language** position enables the user to select the language of the user interface.

For activation of the Russian version of the user interface, a special code has to be entered.

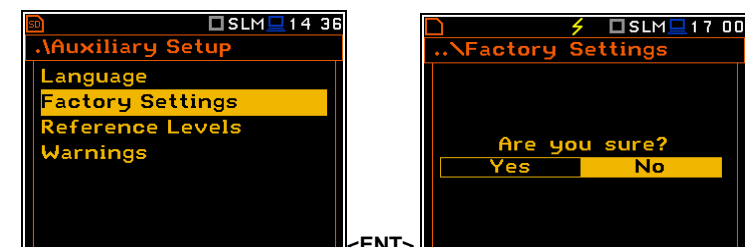
If, at power on, an unknown instrument language interface appears on the display the user can reset the instrument by means of the four **<Shift/Enter/Alt/Start>** push-buttons pressed together. After this the instrument will go back to the default setup with the English interface.



### 9.2. Return to the factory settings – Factory Settings

The **Factory Settings** position enables the user to return to the default setup of the instrument.

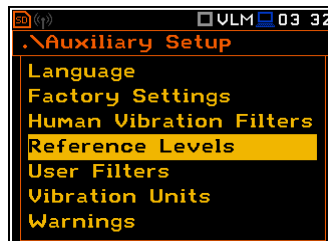
The factory setup can also be installed by means of the four **<Shift/Enter/Alt/Start>** push-buttons pressed together.



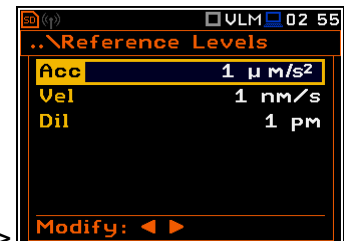


### 9.3. Reference signal in vibration measurements - Reference Levels

The **Reference Levels** sub-list enables the user to set the reference levels of the vibration signal or to inform the user about the reference level in the case of sound measurements. The values, which are set here, are taken into account during the calculations of the measurement results expressed in the Logarithmic (dB) scale.



&lt;ENT&gt;

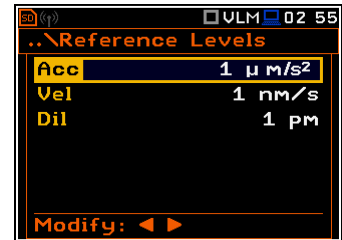


#### Reference level for vibration measurements

In the **Acc** position the user can set the reference level of the acceleration signal. It is possible to set this level from 1  $\mu\text{m/s}^2$  to 100  $\mu\text{m/s}^2$ .

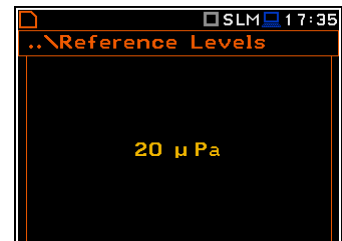
In the **Vel** position, the user can set the reference level of the velocity signal. It is possible to set this level from 1  $\text{nm/s}^{-1}$  to 100  $\text{nm/s}^{-1}$ .

In the **Dil** position, the user can set the reference level of the displacement signal. It is possible to set this level from 1 pm to 100 pm.



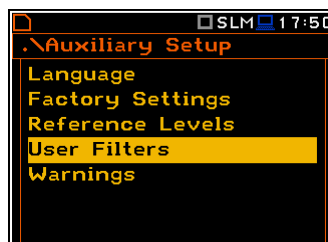
#### Reference level for sound measurements

In the case of sound measurements the **Reference Levels** sub-lists is used only to inform the user that the reference level of the acoustic signal is equal to 20  $\mu\text{Pa}$ . After pressing the <ESC> or <ENTER> push-buttons the sub-list is closed.



### 9.4. Setting the coefficients of the user filters - User Filters

The **User Filters** position enables the user to introduce the values of the coefficients of the user defined filters.

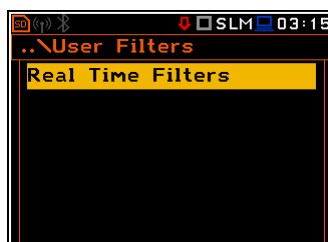


&lt;ENT&gt;



#### 9.4.1 Introduction the parameters of real time filters - Real Time Filters

The **Real Time Filters** sub-list enables the user to introduce the values of the correcting coefficients taken into account in the **real time measurements**. The **Real Time Filters** (sub-list) contains 3 positions: **R1**, **R2**, **R3**.



&lt;ENT&gt;



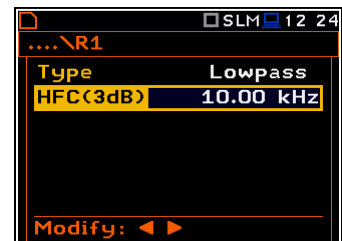
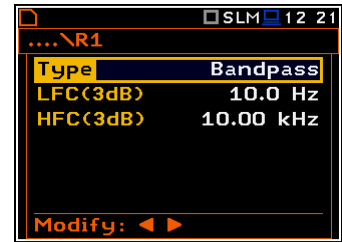
### Selecting real time filter

The **Rx (R1, R2, R3)** window consists of three positions: **Type**, **LFC(3dB)**, **HFC(3dB)**. In case of a band-pass filter the user has to determine two frequencies: the **LFC(3dB)**, which denotes the (Low Frequency Corner), and the **HFC(3dB)**, which denotes the (High Frequency Corner), of the **Rx** filter. The amplitude of the input signal is attenuated by half at these frequencies. The available values for **LFC** are from 10 Hz to 10.0 kHz, and for **HFC** the available values are from 100 Hz to 10.00 kHz.

In the **Type** position three options are available: **Highpass**, **Bandpass** and **Lowpass**. This parameter denotes the type of the digital filter, which has to be implemented. All filters mentioned above, high-pass, band-pass and low-pass, are the second order with the slope equal to 12 dB/octave.

In case of a low-pass filter the user has to determine the **HFC(3dB)** parameter, which denotes the **HFC (High Frequency Corner)** of the **Rx** filter. The amplitude of the input signal is attenuated by half at this frequency. The available values are from 100 Hz to 10.0 kHz.

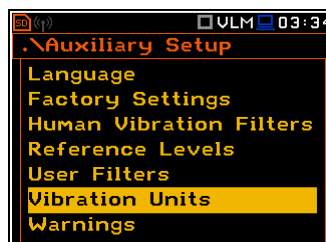
In case of a high-pass filter the user has to determine the **LFC(3dB)** parameter, which denotes the **LFC (Low Frequency Corner)** of the **Rx** filter. The amplitude of the input signal is attenuated by half at this frequency. The available values of the **LFC** are from 10 Hz to 10.0 kHz.



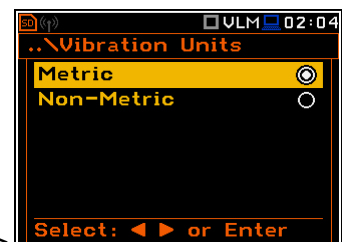
## 9.5. Selection of the Vibration units - Vibration Units

The **Vibration Units** position enables the user to select the units for the Vibration measurements (this position is available only in the Vibration modes).

It is possible to select the **Non-Metric** (e.g. g, ips, mil etc.) or **Metric** units (e.g. m/s<sup>2</sup>, m/s, m etc.).

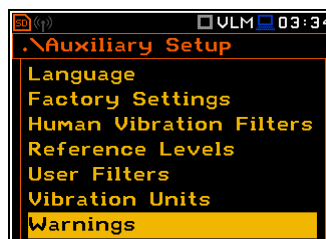


<ENT>

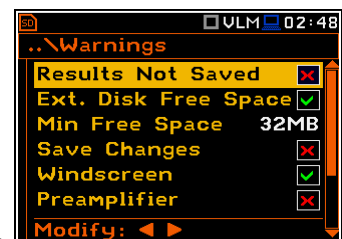


## 9.6. Warnings setup – Warnings

The **Warnings** sub-list enables the user to select the messages, which may be displayed during the normal operation of the instrument.



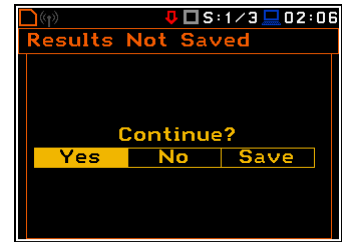
<ENT>



### Saving the measurement results in a file

When the **Results Not Saved** position is set to be active a special warning can be displayed after pressing the **<Start/Stop>** push-button. It will happen in a case when the result of the previous measurement was not saved in the instrument.

The question **Continue?** appears with the warning message. There are three options: **Yes**, **No** or **Save**. If **Yes** is chosen, the instrument returns to the active mode of result presentation starting the new measurement process. If **No** is chosen, the instrument returns to the active mode of measurement result's presentation without starting the new measurement process. If **Save** option is chosen, then the measurement results are saved.



### Checking free space on the external disk

The **Ext. Disk free Space** position switches on or off the checking of free space on the external memory and generates the warning when the space is lower than Min Free Space.

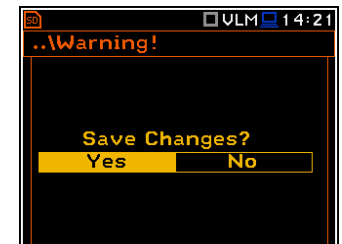
### Minimum memory free space setting

In the line **Min Free Space**, the user can determine the amount of the **SD card** or **USB disk** memory free space. The selected limit has to be within the range [1 MB, 1024 MB]. If the available memory is not greater than that limit, the warning will be displayed.



### Confirmation of parameter changes

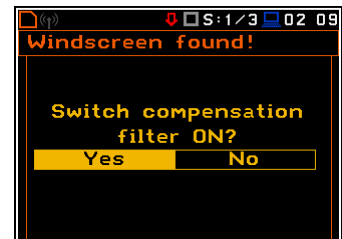
In the line **Save changes** the user can switch on the option of confirmation of menu parameter changes after exiting the screen with the parameter list by means of the **<ESC>** push-button.



### Windscreen detection

If the **Windscreen** parameter is switched on the instrument will ask to switch on or off the compensation filter every time the windscreen is removed or put on again. The windscreen is detected automatically if the **Windscreen** parameter is set on **Auto** (path: **<Menu> / Measurement / Compensation Filter**).

When **Windscreen** is switched on and the instrument detects the windscreen the next message appears. The user shall choose **Yes** or **No** and press **<Enter>**.



### Preamplifier detection

If the **Preamplifier** parameter is switch on then the instrument will show the message in case the preamplifier is connected to the instrument through the extension cable.

When **Preamplifier** is switched on and the instrument detects the extension preamplifier cable, then the message shown here appears.

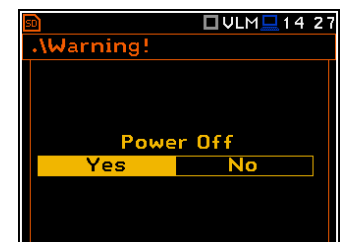


### Self-vibration warning

If the **Self Vibration Level** parameter is switched on then the instrument will show the message in case self vibration level is high and can lead to the loss of measurement accuracy.

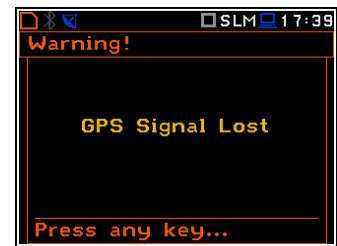
### Confirmation of the instrument switch off

If the **Power Off** parameter is switched on then the instrument will show the message in case the user is trying to switch the instrument off.



**GPS signal lost warning**

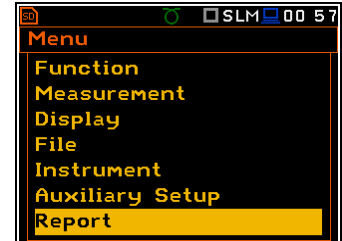
If the **GPS Signal Lost** parameter is switched on then the instrument will show the message in case the GPS signal was lost.



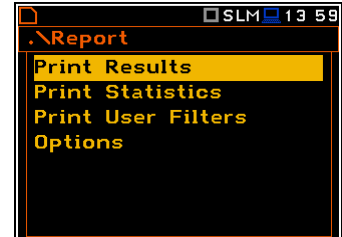
## 10. REPORTS PRINTING – Report

The printed reports of the Sound or Vibration measurement results in the predefined format can be obtained by means of the **Report** list. The **Report** list contains the following elements:

- Print Results** enables the user to print out the measurement results on the default printer or to send the measurement results to a PC using SvanPC software and USB interface;
- Print Statistics** enables the user to print out the statistics of the measurement results; this position is not available in the case of Vibration measurements;
- Print User Filters** enables the user to print out on a printer connected directly to the instrument the values of the user filters introduced in the instrument or to send them to a PC using SvanPC software and USB interface;
- Options** enables the user to determine the options of the report.



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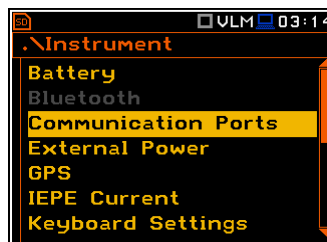
In order to obtain the report the user has to connect the instrument to the printer's RS 232 port using the **SV 55** RS 232 interface. This hardware interface is hidden in the Cannon type, 9-pin RS 232 plug-in. On the other end of the **SV 55** interface, which itself looks like a cable, there is the USB Host plug-in. This plug-in should be placed in the USB Host socket of the instrument.

It is also possible to connect the instrument to the USB port of a PC using the proper cable. Measurement results can be easily downloaded to any PC (using the **SC 16** USB interface cable and SvanPC software) and printed out on the printer attached to a PC.

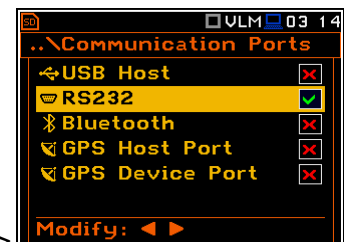


**Notice:** The converter **SV 55** serves as the RS 232 interface. The **SV 55** connection to the **USB Host** socket is detected and after successful detection the headphone icon is switched on. The transmission with the use of **SV 55** is possible only when the instrument is not connected to a PC with the **USB Device** port.

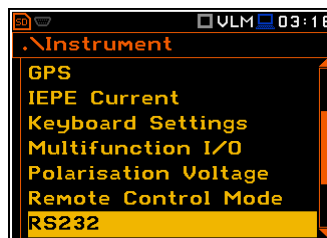
The **RS232** position is switched on by default in the **Communication Ports** list of the **Instrument** menu. Only with this option the USB host controller is woken up and the power consumption is at the lowest level.



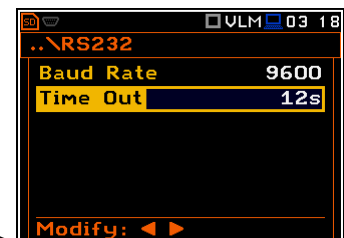
<ENT>



The user has to be sure that the **RS232** port is activated (path: <Menu> / Instrument / Communication Ports) before starting printing reports. Additionally, in the **RS232** list (path: <Menu> / Instrument / RS232) the user has to select the proper speed of the transmission (**Baud Rate**) and the parameter called **Time Out**.



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The RS 232 interface transmission (**Baud Rate**) speed can be selected from the following available values: **1200** (bits / second), **2400** (bits / s), **4800** (bits / s), **9600** (bits / s), **19200** (bits / s), **38000** (bits / s), **57600** (bits / s) or **115200** (bits / s).

The transmission speed should correspond to the same one selected in a printer. The other RS 232 transmission parameters are fixed to **8 bits for data, No parity & 1 Stop bit**. The default value of the **Time Out** parameter is equal to one but it can be too short period for the printers, which are not fast enough. In such cases this parameter may have to be increased.

The description of the **SV 55** pin-outs is given in App. C. Printers with the different connections on the RS 232 socket require the special, individual RS 232 – RS 232 cable that should fulfil the suitable wiring crossover connections.

Printers, in which only the Centronics interface is available instead of the RS 232, can be connected to the instrument by means of the **SV 52** RS 232 – Centronics interface.

Printers, which have only a USB interface, are currently not driven by the instrument.



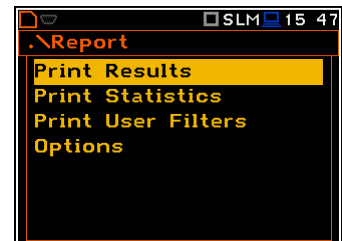
**Notice:** Switch the power off before connecting the instrument to any external device (e.g. a printer or a Personal Computer).



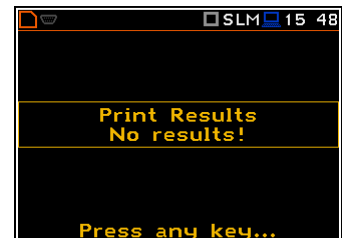
**Notice:** All reports are printed in the character format using the ASCII set on either A4 or A5 size paper.

## 10.1. Printing the measurement results - Print Results

The **Print Results** position enables the user to print the report on the attached printer or to send out the report to a PC using the SvanPC software and the USB interface.

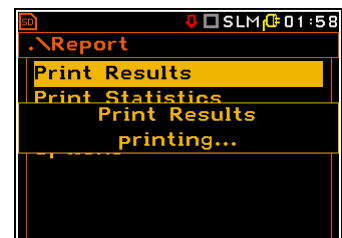


After pressing the **<ENTER>** push-button the instrument checks its current state. If the measurements are running, printing is not possible and the appropriate message is displayed. If no results were recorded the next message is displayed.

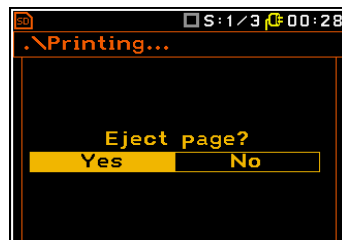


If a measurement has been already performed and results are available, the presented message is displayed.

The data are transferred from the instrument to the attached printer, while the message is displayed. The instrument returns to the **Report** list after transferring all data.



The following confirmation question is displayed after the printing, if the **Prompt** parameter was selected in the **Eject Page** position (path: **<Menu> / Report / Options**). The user has to answer in this case if the paper in the printer has to be ejected to the new page.

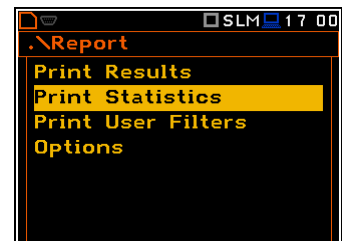


The similar message is displayed after sending out the statistics of the results and user filters to the printer (**Print Statistics** and **Print User Filters**).

The message about the time limit is displayed if the printer (or a PC) is not connected or there is any other reason that it does not receive the data. The instrument waits for the reaction of the user (any push-button should be pressed except **<Shift>** and **<Alt>**) and after pressing a push-button it returns to the **Report** list. Another message is presented and the instrument waits for the reaction of the user if there is no data to be printed.

## 10.2. Printing the statistics of sound measurement results - Print Statistics

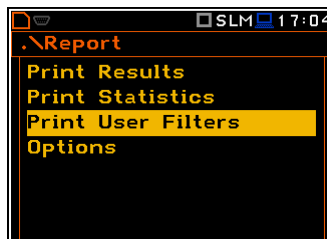
The **Print Statistics** position enables the user to print the results of the statistics analysis on the attached printer. This position is not accessible for the Vibration measurements.



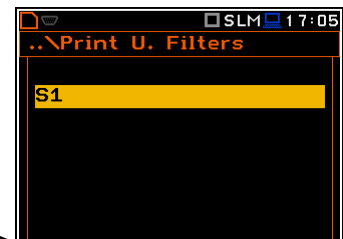
## 10.3. Printing the coefficients of the user filters - Print User Filters

The **Print User Filters** position enables the user to print out the values of the user filters introduced in the instrument: **S1**, **S2**, **S3**.

The contents of the selected file is sent out to the attached printer (or to a PC) after pressing the **<ENTER>** push-button. The following message is displayed during the printing:

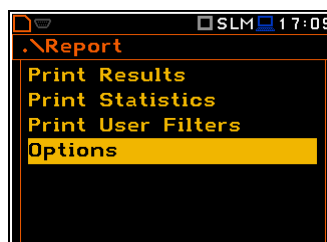


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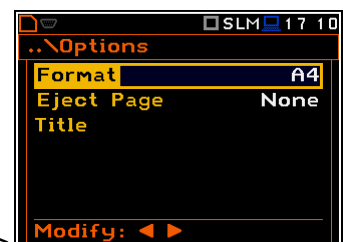


## 10.4. Selection the printing options – Options

The **Options** list enables the user to select the format of the listing (**Format**), the way the paper is ejected in the printer (**Eject Page**) and to edit the title of the report (**Title**).



<ENT>





### Selection of the format of the print out

The **Format** position enables the user to select the format of the listing (**A4** and **A5** options are available).

### Controlling the paper ejection after print out

The **Eject Page** position enables the user to control the ejection of the paper after the listing is done. The following options are available: **Prompt** (the instrument asks whether to eject the page after printing report, statistics or catalogue), **Auto** (after printing, the paper is ejected automatically) and **None** (the paper is not ejected after printing). In particular, it is possible to have one result after another using the **None** or **Prompt** options.

The request is displayed after printing the measurement results, statistics or filters (**Print Results**, **Print Statistics**, **Print User Filters**) if the **Prompt** parameter was selected in the **Eject Page** position. The user has to answer in this case if the paper in the printer has to be ejected to the new page. After pressing **<ENTER>** the instrument returns to the **Report** list.

The message about the time limit is displayed if the printer is not connected or there is any other reason that it does not eject a paper. The instrument waits for the reaction of the user (any push-button should be pressed except **<Shift>**) and after pressing a push-button it returns to the **Report** list.

### Editing the user text

The **Title** position enables the user to edit the text added to the file and to the report to be printed. The text editing is performed in the special window which is opened by pressing the **<◀>**, **<▶>** push-buttons.

## 11. 1/1, 1/3, 1/6 AND 1/12 OCTAVE ANALYSER

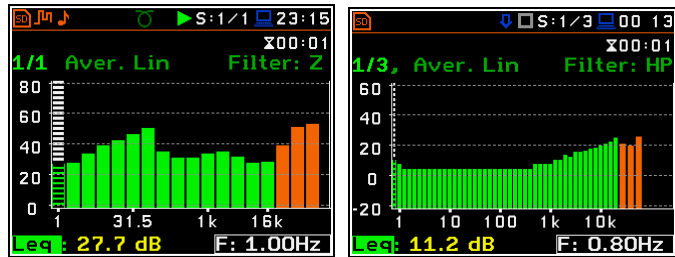
The instrument operates as a real time **1/1 Octave - 1/12 Octave** analyser (RTA) in a very similar way to the **Level Meter** mode and, in addition, **1/1 Octave - 1/12 Octave** analysis is performed in parallel with the **SLM** or **VLM** operations. All 1/1-octave, 1/3-octave, 1/6-octave and 1/12-octave digital pass-band filters are working in real-time with the weighting filters (**HP**, **Z**, **A**, **B** or **C** - in the case of sound analysis: **HP** - in the case of vibration analysis) selected in the **Spectrum** (path: *Menu / Measurement / Spectrum / Filter*) and the linear RMS (Leq) detector. This enables the user to pre-weight a spectrum with one of the selected broadband frequency curves if required for a particular application such as the provision of hearing protectors in the control of high workplace noise levels.



**Notice:** The TOTAL RMS results are measured with the weighting filters (**A**, **C**, **Z** or **S1**, **S2**, **S3** - in case of sound measurements; **HP**, **HP3** and **HP10** or **S1**, **S2**, **S3** - in case of vibration measurements) without taking into account the settings of the level meters for profiles. The spectra are always linearly averaged. Thus, the **Total** values from **1/1 Octave - 1/12 Octave** analysis can be different from those obtained for the profiles (if the **RMS Integration** was set as **Exp**).

The **SVAN 979** instrument operates in two ranges, called **Low** and **High**, which can be selected in the **Range** window (path: *<Menu> / Measurement / Range*).

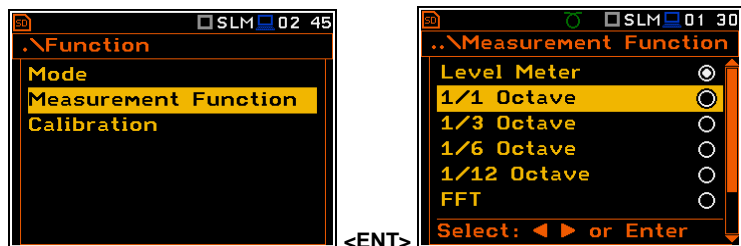
The results of **1/1 Octave - 1/12 Octave** analysis (spectra) can be examined by the user on a display in the **Spectrum** presentation mode. The availability of this mode can be switched on or off by the user (path: *<Menu> / Display / Display Modes*).



**1/1 Octave - 1/12 Octave** spectra for all centre frequencies of pass-band filters together with the **Total** overall values measured with preselected frequency weighting filters are presented in the **Spectrum** mode if selected in the spectrum display menu. The read-out of the value of interest in the spectrum can be done using a vertical cursor on the screen using the **<◀>** or **<▶>** push-buttons.

### 11.1. Selection of 1/1 Octave - 1/12 Octave analysis mode

In order to select the **1/1 Octave - 1/12 Octave** analysis mode the user has to enter the **Function** list by pressing the **<Menu>** push-button, then select the **Function** text and press **<ENTER>**. Then, the user has to open the **Measurement Function** window, highlight the required analysis bandwidth and press **<ENTER>**.



**Notice:** It is not possible to change the current function during live measurements. In this case the instrument displays for about 2 seconds the text: **"Measurement in Progress"**. In order to change the current measurement function the instrument must be stopped!

### 11.2. Selecting the parameters of 1/1 Octave - 1/12 Octave analysis

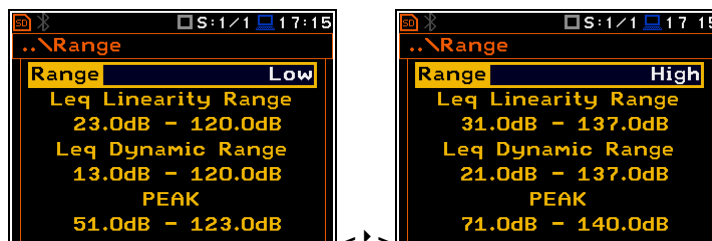
The execution of **1/1 Octave - 1/12 Octave** analysis depends on a certain number of parameters, which can be set in the different windows of the **Measurement** list. Namely, the user can set there the **Range** of the

measurements (path: <Menu> / Measurement / Range) and **Filter** (path: <Menu> / Measurement / Spectrum). Additionally, the user can set or be informed about the **Band** of the analysis (path: <Menu> / Measurement / Spectrum / Band) and switch on or off the recording of the spectra in the logger file (path: <Menu> / Measurement / Logging / Logger Results).

The output of the selected **1/1 Octave - 1/12 Octave** filter can be also used as the triggering signal in the **Logger Trigger** window (path: <Menu> / Measurement / Logging / Logger Trigger).

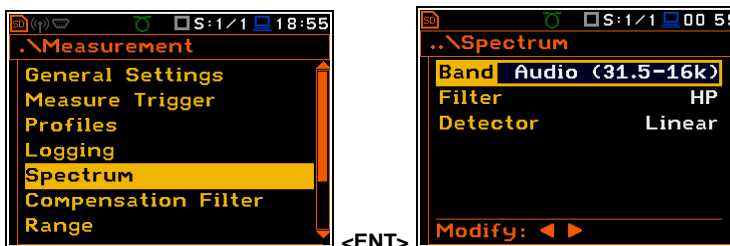
### 11.3. Measurement range selection - Range

In the **1/1 Octave - 1/12 Octave** analyser the user can select the input ranges specified in Appendix C, named as **Low** and **High**. The selection of the input range is possible after entering the **Range** window of the **Measurement** list.



### 11.4. Pre-weighting filter and frequency band selection - Spectrum

In the **1/1 Octave - 1/12 Octave** modes a context element (**Spectrum**) appears on the **Measurement** list (path: <Menu> / Measurement / Spectrum). In the **Spectrum** window the user may select the pre-weighting broadband frequency filter and the band in the case of sound measurements.



#### Selection the band

The **Band** position enables the user to select the applied band of **1/1 Octave - 1/12 Octave** analysis. Available values of the bands of the analysis are as follows:

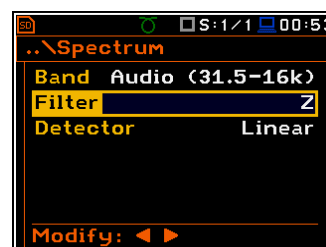
- Sound 1/1 Octave analysis: **Audio (31.5-16k)** and **Full (1-16k)**;
- Sound 1/3 Octave analysis: **Audio (20-20k)** and **Full (0.8-20k)**;
- Sound 1/6 Octave analysis: **Audio (20-21.4k)** and **Full (0.73-21.4k)**;
- Sound 1/12 Octave analysis: **Audio (20.3-22k)** and **Full (0.71-22k)**;
- Vibration 1/1 Octave analysis: **Full (1-16k)**;
- Vibration 1/3 Octave analysis: **Full (0.8-20k)**;
- Vibration 1/6 Octave analysis: **Full (0.73-21.4k)**;
- Vibration 1/12 Octave analysis: **Full (0.71-22k)**.

#### Weighting filter selection

The **Filter** parameter influences the calculations of the **1/1 Octave - 1/12 Octave** analysis. The frequency characteristics of those filters are given in Appendix D.

The following pre-weighting filters are available in the case of the **1/1 Octave - 1/12 Octave** analysis in sound modes:

- **A** type 1 according to the IEC 651 and IEC 61672-1 standards,
- **C** type 1 according to the IEC 651 and IEC 61672-1 standards,

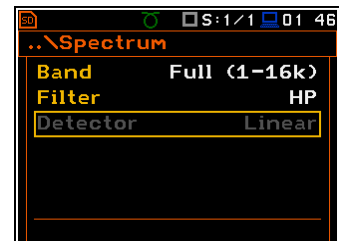
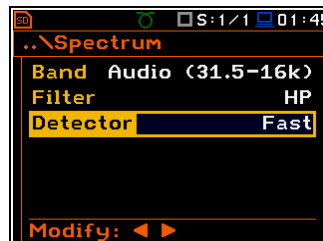
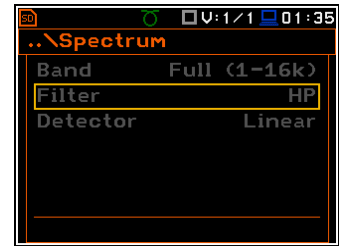


- **B** type 1 according to the IEC 651 standard,
- **Z** type 1 according to the IEC 61672-1 standard
- **HP** type 1 according to the IEC 61672-1 standard (vibration only).

**1/1 Octave - 1/12 Octave** .The characteristics of the filters are given in Appendix D.

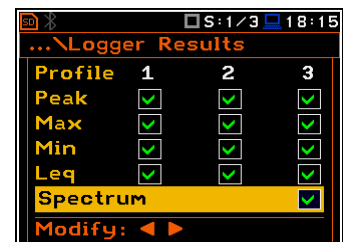
### Selection of the detector

The **Detector** position enables the user to select the detector for the **1/1 Octave - 1/12 Octave** analysis. In case of Sound measurements it is possible to select for the Audio Band three types of detector: **Linear**, **Fast** and **Slow**. For the Full Band (and for all Vibration measurements) only one **Linear** detector is available.



## 11.5. Saving of 1/1 Octave - 1/12 Octave analysis results - Logger Results

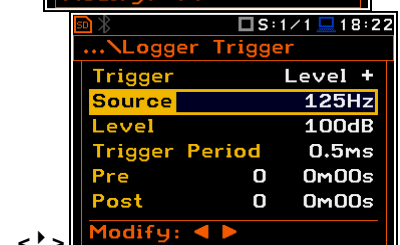
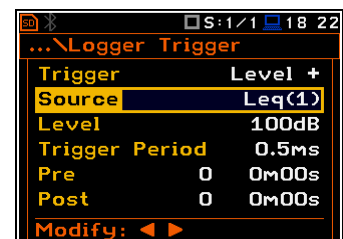
The **RMS** results from **1/1 Octave - 1/12 Octave** analysis can be saved in the logger's file. The spectrum saving in the logger file is defined by activation / deactivation the **Spectrum** position by means of the <◀, ▶> push-buttons.



## 11.6. Selecting the result which triggers recording for the logger in 1/1 Octave - 1/12 Octave analysis - Logger Trigger

In the **Level Meter** mode only the **Leq** result for Sound and **RMS** for Vibration measurements from the first profile (**Leq(1)/RMS(1)**) is used for triggering the measurement results recording for the logger of the instrument. The **Source** position in the **Logger Trigger** window is not accessible in that mode. However, in **1/1 Octave - 1/12 Octave** analysis it is possible to access the above mentioned position and to make a selection of a specific filter band for triggering purposes.

For example, the results coming from the output of the **1/1 Octave** filters (125 Hz, 250 Hz, 500 Hz, 1.00 kHz, 2.00 kHz, 4.00 kHz, 8.00 kHz and 16.0 kHz), are available as well as the **Leq** or **RMS** result from the first profile.



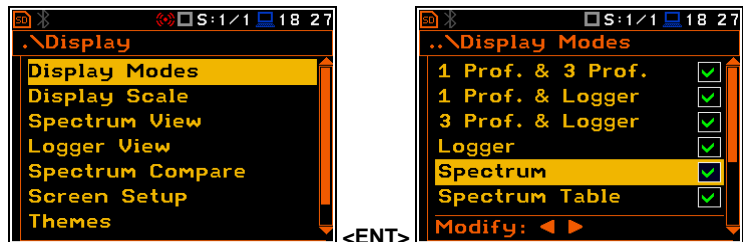
## 11.7. Display options in 1/1 Octave - 1/12 Octave analysis mode

The **Display** list is used for setting the various parameters, which are mainly dedicated for the control of the display. The following windows contain the elements that influence the presentation of the results of **1/1 Octave - 1/12 Octave** analysis:

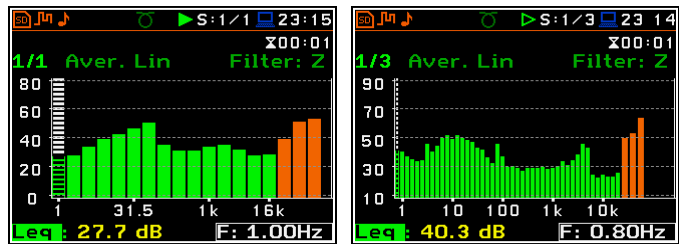
<b>Display Modes</b>	enables the user to select the mode of the presentation of the <b>1/1 Octave - 1/12 Octave</b> spectra;
<b>Display Scale</b>	enables the user to change the scale of the vertical and horizontal axis of the spectra presentation and switch on or off the grid and autoscale;
<b>Spectrum View</b>	enables the user to choose the type of the spectrum to be presented and to activate the <b>Max</b> and <b>Min</b> spectrum;
<b>Spectrum Type</b>	enables the user to change the spectrum type presented on the display: <b>Acceleration</b> , <b>Velocity</b> and <b>Displacement</b> ;
<b>Logger View</b>	enables the user to select and present the spectra results stored in the logger files.

## 11.8. Presentation of 1/1 Octave - 1/12 Octave analysis results

The **Spectrum** and **Spectrum Table** positions of the **Display Modes** list are accessible only for instruments fitted with the **1/1 Octave - 1/12 Octave** functions.

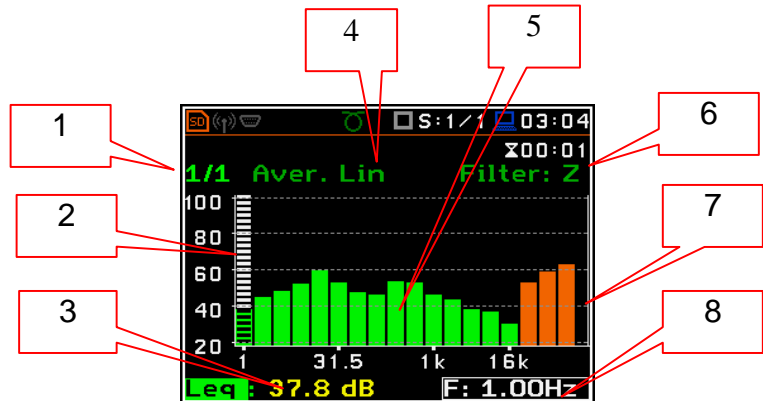


When the **Spectrum** mode is switched on the measurement screen in the **Spectrum** visualisation mode is shown here for octave and third octave bands in the sound mode.

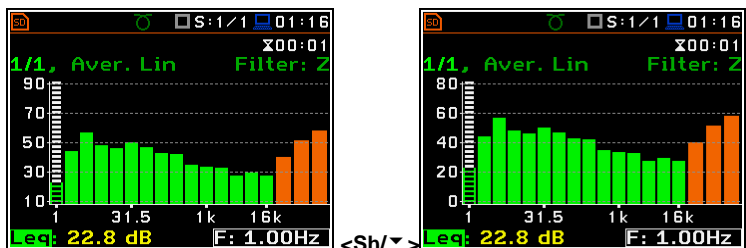


### Field description of the Spectrum view

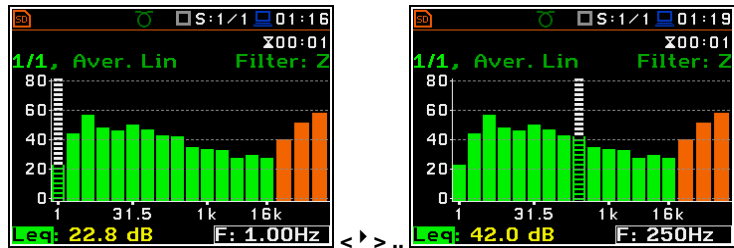
1. Type of spectrum
2. Cursor position
3. Value for the cursor position
4. Averaging used
5. Spectrum plot
6. Frequency pre-weighting filter used
7. Total values
8. Central frequency for the cursor position



The user may shift the Y-axis during the spectrum presentation after pressing the **<Shift>** and **<^>** (or the **<Shift>** and **<v>**) push-buttons.

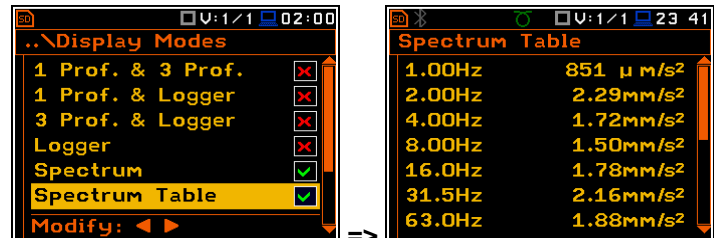


The user may change the cursor position by means of the <◀>, <▶> push-buttons. The frequency and appropriate value are presented in the line below the plot. The user can change quickly to the first or last spectrum line by simultaneously pressing the <◀> or <▶> buttons with <Shift>.



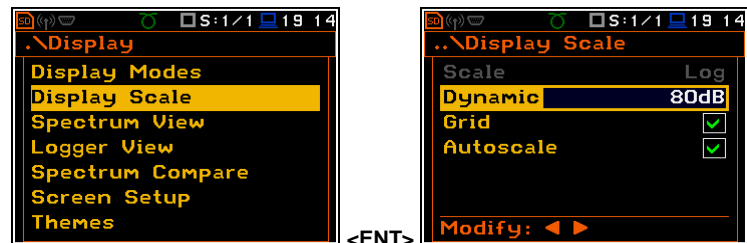
### Spectrum table view

The **Spectrum Table** position is accessible with the **1/1 Octave - 1/12 Octave** function (path: <Menu> / Function / Measurement Function) and switches on the table presentation of the spectra.



## 11.9. Setting the scale of spectrum presentation - Scale

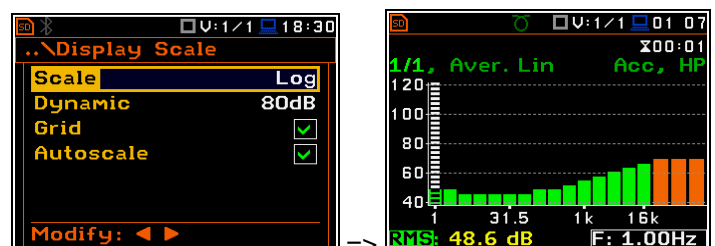
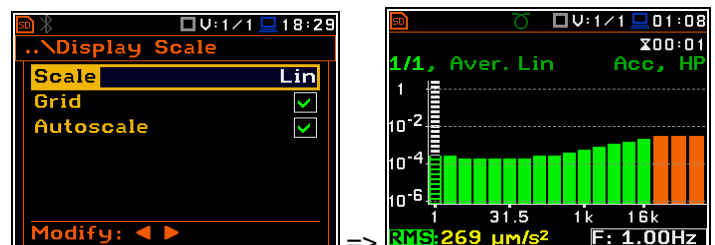
The **Display Scale** sub-list enables the user to change the scale in the available modes of graphical presentation of the measurement results and to switch the grid on or off.



### Setting the scale of the measurement results presentation

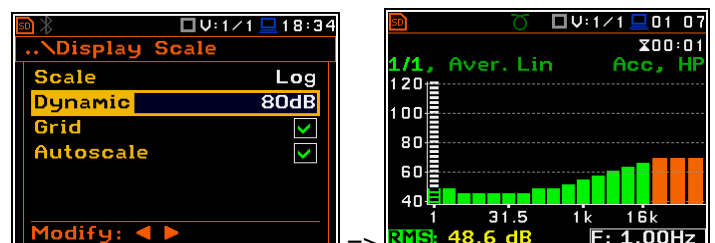
The **Scale** position is accessible only in case of Vibration measurement modes. Two options are available: **Lin** (linear) and **Log** (logarithmic). In case of **Lin** the graphical presentation and the units are linear. In case of **Log** graphical presentation is given in the logarithmic scale and the measurement results are expressed in decibels (the result is related to the values set in the **Reference Levels** (path: <Menu> / Auxiliary Setup / Reference Levels)).

In case of the Sound measurements the **Scale** position is not active. All results are presented in dB.



### Scaling the vertical axis of the graphical mode presentation

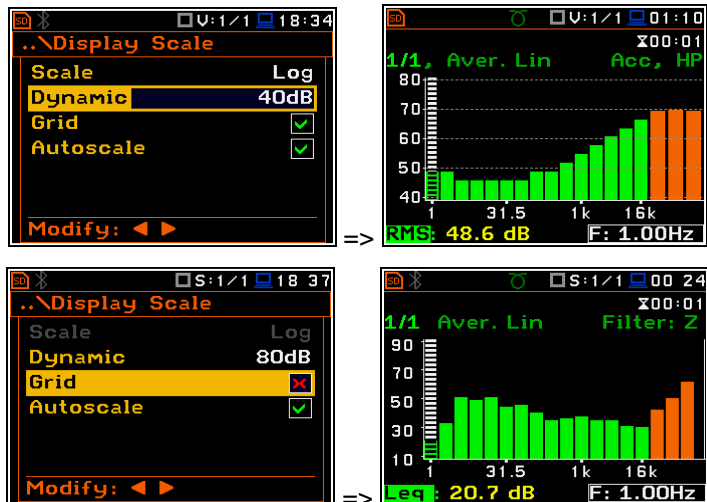
The **Dynamic** position enables the user to select the required dynamic range scaling of the spectrum presentation. It is possible to select the range from the set: **10dB**, **20dB**, **40dB** and **80dB**. In another words the user may obtain double, four and eight times the expansion of the vertical axis (as the default the vertical axis corresponds to 80 dB, after expansion it corresponds to 40 dB, 20 dB and 10 dB – respectively). Additional



settings of **100dB** and **120dB** are also available for the dynamic scaling of the Y axis display.

### Switching the grid on/off

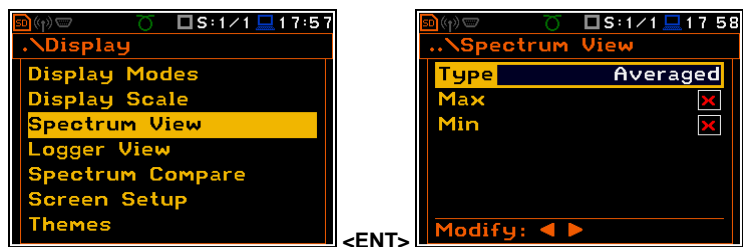
The **Grid** enables the user to switch on or off the horizontal grid lines in the spectrum presentation mode.



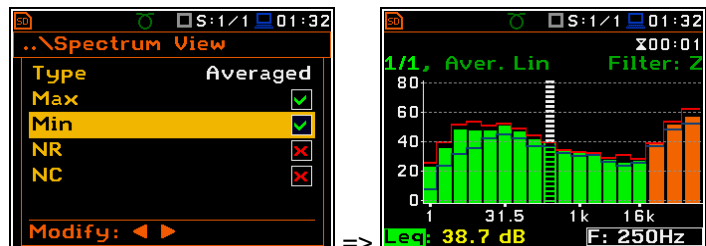
The **Display Scale** sub-list enables the user to change the scale in the available modes of graphical presentation of the measurement results and to switch the grid on or off.

## 11.10. Setting the parameters of the spectrum presentation - Spectrum View

The user can select the different spectra to be visible on the display in the **Spectrum View** window (path: <Menu> / Display / Spectrum View). In the **Spectrum View** window the following spectrum types may be selected: **Averaged**, **Instantaneous**, **Max** or **Min**.

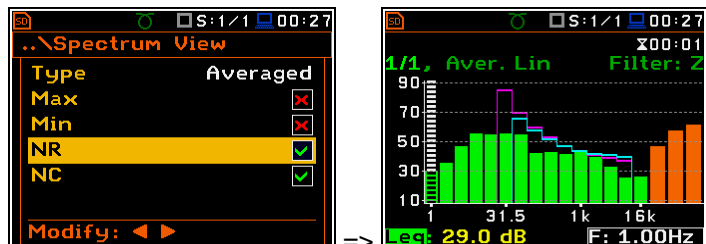


In case when the **Averaged** or **Instantaneous** spectrum is selected the user can additionally switch on or off the presentation of the **Max** and/or **Min** values for every displayed spectrum band by placing or replacing the special character in the displayed inversely line with the **Max** or **Min** text by means of the <^>, <^> push-buttons.



### NR and NC results view

In case of 1/1 octave Sound measurements (S:1/1) noise rating (NR) and noise criterion (NC) values can be additionally presented in the same plot as main spectrum when the **NR** or **NC** parameter is switched on. A violet line shows the **NR** results for the octave bands with central frequencies: **31.5Hz**, **63.0Hz**, **125Hz**, **250Hz**, **500Hz**, **1.00kHz**, **2.00kHz**, **4.00kHz** and **8.00kHz**. A blue line shows the **NC** results for the octave bands with central frequencies: **63.0Hz**, **125Hz**,





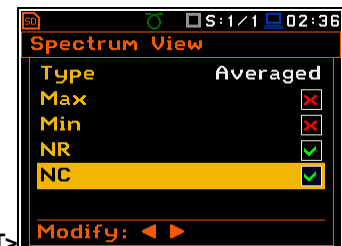
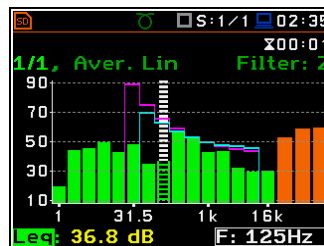
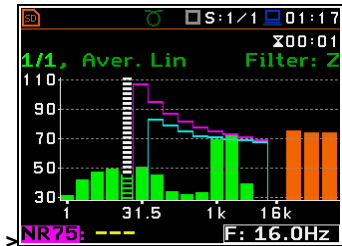
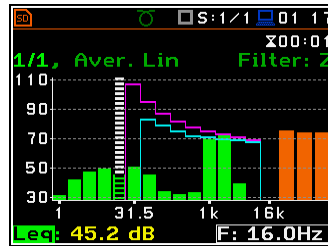
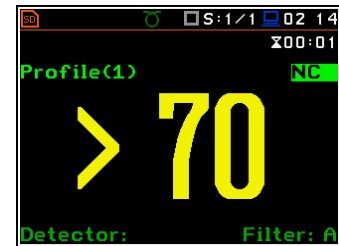
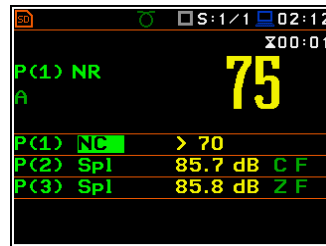
250Hz, 500Hz, 1.00kHz, 2.00kHz, 4.00kHz and 8.00kHz.

The **NR** or **NC** results can be seen also in the **1 Profile** and/or **3 Profile** modes.

If the **NC** or **NR** result exceeds the maximum value for which the curves are defined (NC=70 or NR=130) then before the displayed result the character (>) appears and the highest defined curve is displayed.

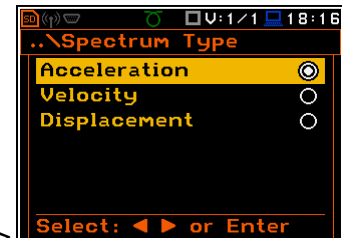
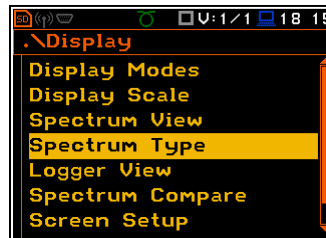
To switch the cursor to read the **Max**, **Min**, **NR** or **NC** values the user should select the field in the left hand corner of the display by means of the <^>, <v> push-buttons. Then select the appropriate value by means of the <^>, <v> push-buttons pressed together with <Alt>.

The view of the spectrum screen can be adjusted quickly without the measurement to be stopped. After press the <ENTER> push-button the **Spectrum View** list is displayed. The user may make necessary adjustments and return to the **Spectrum** view after confirmation of the changes by pressing the <ENTER> push-button.



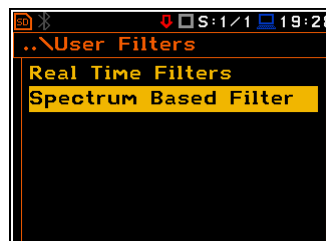
### 11.11. Selection of the Spectrum Type in the Vibration modes - Spectrum Type

The user can select the different type of vibration spectrum to be presented on the display in the **Spectrum Type** window (path: <Menu> / Display / Spectrum Type). The **Spectrum Type** position is available only for Vibration modes and the following spectrum types can be selected in the **Spectrum Type** window: **Acceleration**, **Velocity** or **Displacement**.



### 11.12. Setting filter coefficients for 1/1 Octave - 1/12 Octave analysis - Spectrum Based Filter

The **Spectrum Based Filter** sub-list (path: <Menu> / Auxiliary Setup / User Filters), enables the user to introduce the values of the filter coefficients correcting the results of the **1/1 Octave - 1/12 Octave** analysis. The results of the analysis (the Total values) can be modified by the introduced factors.



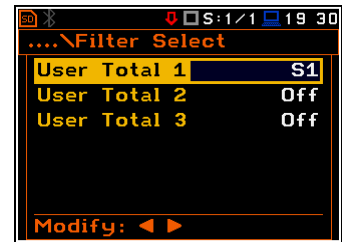
#### Selection the user filter for total value calculation – Filter Select

The **Filter Select** sub-list enables the user to select the filter **S1**, **S2**, **S3**, **S4** or **S5**, used for calculation of the

Total values. The filter selection is different for Sound and Vibration modes.

### Sound modes

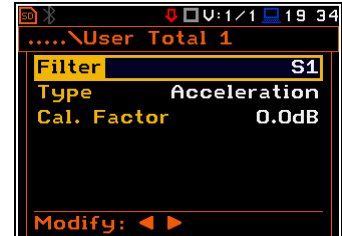
In the **Filter Select** window the user may select one of five above mentioned filters (**S1**, **S2**, **S3**, **S4** and **S5**) for 1, 2 or 3 **User Total** values calculations.



### Vibration modes

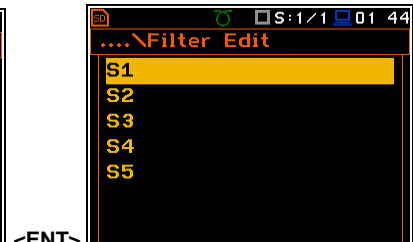
In the **Filter Select** window the user may open three **User Total** window.

In the **User Total** window the user may select one of five filters: **S1**, **S2**, **S3**, **S4** and **S5**, set the calibration factor and type of integration filter for measuring **Acceleration**, **Velocity** and **Displacement**.

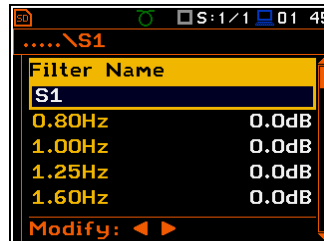


### Setting the coefficients of the user filters set

The **Filter Edit** sub-list enables the user to select which filters should be edited; the available options are as follows: **S1**, **S2**, **S3**, **S4** and **S5** or any other transmitted to the instrument from a PC by means of the interface.

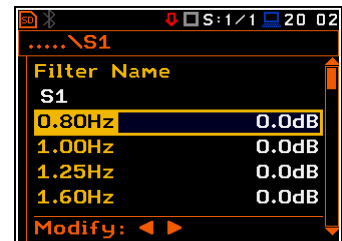


The filter name can be changed in the edition window, which is opening by means of the < > push-buttons.



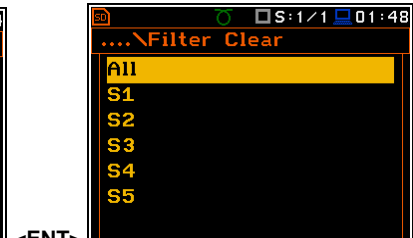
The opened window contains the centre frequencies of the filters and their coefficients:

- **0.80 Hz:** available values for 0.8 Hz centre frequency filter: **-100.0dB ... 100.0dB**
- **1.00 Hz:** available values for 1Hz centre frequency filter: **-100.0dB ... 100.0dB**
- ...
- **20.0kHz:** available values for 20 kHz centre frequency filter: **-100.0dB ... 100.0dB**



### Clearing the coefficients of the user filters

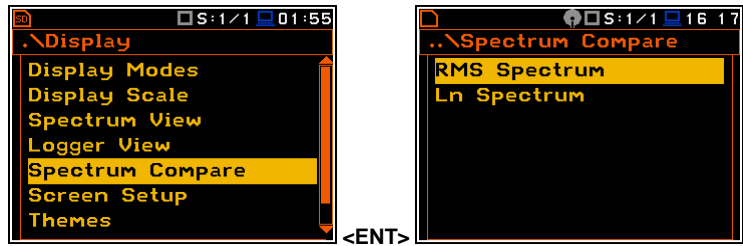
The **Filter Clear** position enables the user to clear the values of the user coefficients of octave or third octave filters. It is possible to clear all sets of coefficients (**All**), to clear the first set (**S1**), to clear the second set (**S2**), to clear the third one (**S3**) or any other transmitted to the instrument from a PC by means of the interface.



## 11.13. Setting the parameter for spectrum comparison – Spectrum Compare

The **Spectrum Compare** position enables the user to compare spectrum with the reference one.

The **Spectrum Compare** option is available for **1/1 Octave** and **1/3 Octave** analysis. It enables the user to compare two spectra. Both spectra will be presented on the display.

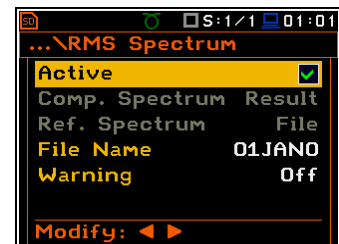


The file with the spectrum assumed as the reference one has to be saved in the instrument's memory. Then the **Spectrum Compare** function should be activated and a file with the reference spectrum should be selected in the **File Name** position of the **RMS Spectrum** window or the **LN Spectrum** window, if statistics in sound mode are to be taken into comparison. Then the user has to start second measurement and the spectrum from the reference file and the spectrum currently calculated will be compared.

Spectrum comparison may be performed in the following way:

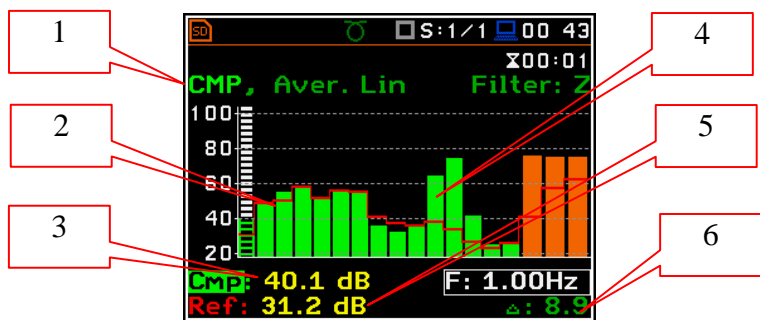
1. Select the **1/1 Octave** or **1/3 Octave** measurement function (path: <Menu> / Function / Measurement Function).
2. Make proper measurement settings like integration period, measurement range, filter, band etc. (path: <Menu> / Measurement / General Settings).  
If statistics are taken into comparison (**LN Spectrum** option available for sound mode for the **1/1 Octave** or **1/3 Octave** analysis) the user should activate the **Save Statistics** option for both measurements (path: <Menu> / File / Save Options).
3. Perform a reference measurement and save the reference spectrum.
4. Activate **Spectrum Compare** (<Menu> / Display / Spectrum Compare / RMS (LN) Spectrum). Select the file with the reference spectrum in the **File Name** position.
5. Start the second measurement. Press the <▶> push-button to see spectra on the display.

The **Active** position enables to switch on the spectrum comparison option.

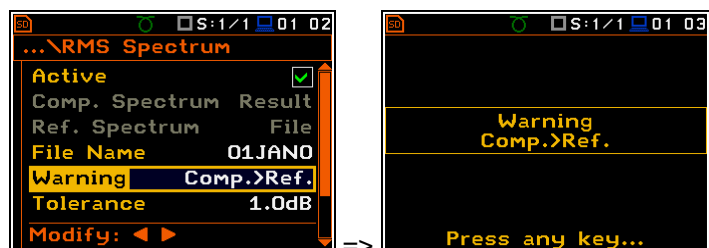


#### Field description:

1. Spectrum averaging, filter type
2. Reference spectrum
3. Value of the cursor position for compared spectrum
4. Compared spectrum
5. Value of the cursor position for reference spectrum
6. Difference between reference and compared band value



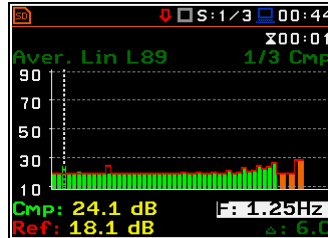
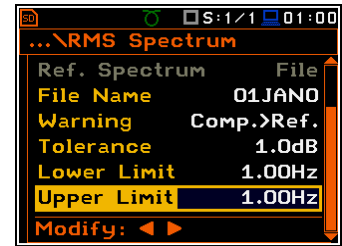
It is also possible to activate **Warning**, which will appear on the display when the results from the compared spectrum are greater (at the value of **Tolerance**) than the results from the reference spectrum (**Comp.>Ref.**) or contrariwise (**Comp.<Ref.**).



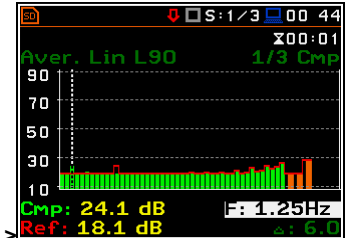
The **Tolerance** can be set from 0.1 dB to 10.0 dB. It means that if the **Tolerance** is set to 1 dB and **Comp.>Ref.** option is selected in the **Warning** position, the message will appear when the calculated spectrum, in any band or line, will be greater than the reference by more than 1 dB.

It is possible also to select the band of the **1/1 Octave** and **1/3 Octave** spectrum for checking warning condition. It can be done by choosing proper values in the **Lower Limit** and **Upper Limit** positions.

When statistics are being compared (**LN Spectrum**) the spectra comparison for the L90 statistic level appears on the display. Pressing **<Shift/◀>** or **<Shift/▶>** enables one to view the comparison result for lower or higher statistical levels.



<Sh/◀>

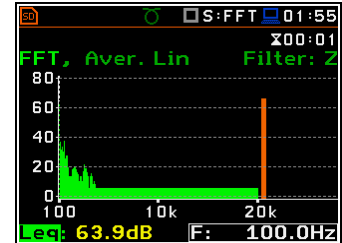


## 12. FFT ANALYSER

The instrument operates as **FFT** analyser in a very similar way to the **Level Meter** mode and, in addition, **FFT** analysis is performed in parallel with the **SLM** or **VLM** operations.

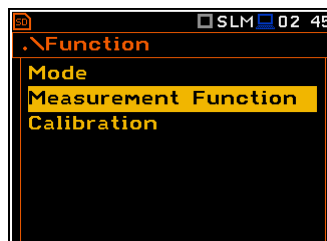
The results of **FFT** analysis (spectra) can be examined by the user on a display in the **Spectrum** presentation mode. The availability of this mode can be switched on or off by the user (path: <Menu> / Display / Display Modes).

**FFT** spectra with the single **Total** overall value measured with preselected frequency weighting filters and windows are presented in the **Spectrum** mode if selected in the spectrum display menu. The read-out of the value of interest in the spectrum can be done using a vertical cursor on the screen.

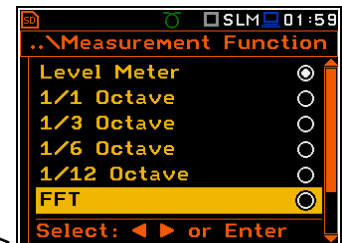


### 12.1. Selection of FFT analysis mode

In order to select the **FFT** analysis mode the user has to enter the **Function** list by pressing the <Menu> push-button, then select the **Function** text and press <ENTER>. Then, the user has to open the **Measurement Function** window highlight the **FFT** line and press <ENTER>.



<ENT>



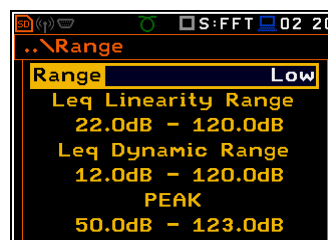
**Notice:** It is not possible to change the current function during live measurements. In this case the instrument displays for about 2 seconds the text: "**Measurement in Progress**". In order to change the current measurement function the instrument must be stopped!

### 12.2. Selecting the parameters of FFT analysis

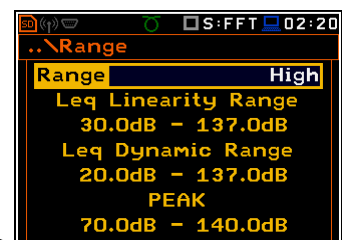
The execution of **FFT** analysis depends on a certain number of the parameters, which can be set in the different windows of the **Measurement** list. Namely, the user can set there the **Range** of the measurements (path: Menu / Measurement / Range) and set the pre-weighting filter (**Filter**), frequency band (**Band**), weighting window (**Window**) and number of lines (**Lines**) in the **FFT** window (path: <Menu> / Measurement / FFT). Additionally, the user can switch on or off the recording of the spectra in the logger file (path: <Menu> / Measurement / Logging / Logger Results).

### 12.3. Measurement range selection - Range

In the **FFT** analyser mode the user can select the input ranges specified in Appendix C, named as **Low** and **High**. The selection of the input range is possible after entering the **Range** window of the **Measurement** list.



< >

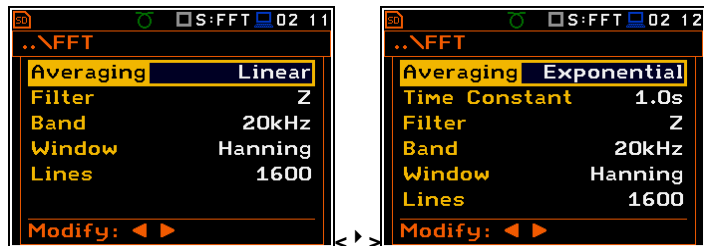
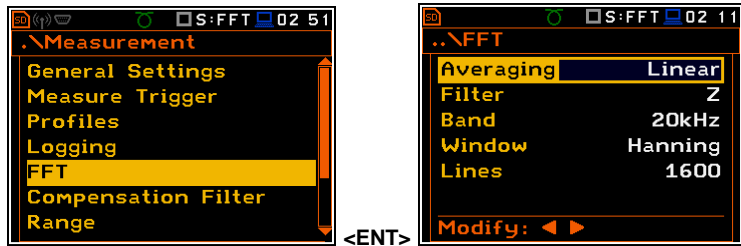


## 12.4. Setting the parameters of FFT analysis - FFT

In the **FFT** mode a context element (**FFT**) appears on the **Measurement** list (path: <Menu> / Measurement / FFT).

In the **FFT** window the user may select the averaging type (**Averaging**), the pre-weighting filter (**Filter**), the frequency band (**Band**), the weighting window (**Window**) and the number of lines (**Lines**) for the FFT analysis.

There are two averaging options: **Linear** and **Exponential**. In case of **Exponential** averaging an additional position appears in this window: **Time Constant**. The **Time Constant** parameter can be selected from the values: **100ms**, **125ms**, **200ms**, **500ms**, **1.0s**, **2.0s**, **5.0s** and **10.0s**.



The following pre-weighting filters are available for the **FFT** analysis of sound:

- **A** type 1 according to the IEC 651 and IEC 61672-1 standards,
- **C** type 1 according to the IEC 651 and IEC 61672-1 standards,
- **B** type 1 according to the IEC 651 standard,
- **Z** type 1 according to the IEC 61672-1 standard
- **HP** type 1 according to the IEC 61672-1 standard

Only one **HP** weighting filter is available for the **FFT** analysis of vibration.

The characteristics of the filters are given in Appendix D.

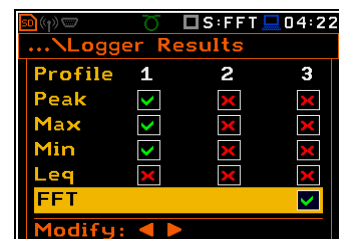
In the **Band** position the user can select the band in which the **FFT** analysis of the signal has to be performed. The user can select: **20 kHz**, **10 kHz**, **5 kHz**, **2.5 kHz**, **1.25 kHz**, **625 Hz**, **312 Hz**, **156 Hz** and **78 Hz**.

In the **Window** position the user can select the weighting window for the **FFT** analysis of the signal. The user can select **Hanning**, **Rectangle**, **Flat Top** and **Kaiser-Bessel** weighting windows.

In the **Lines** position the user can select the number of lines for the **FFT** analysis of the signal. The user can select **1600**, **800** and **400** lines.

## 12.5. Saving of FFT analysis results - Logger Results

The **RMS** results from **FFT** analysis can be saved in the logger's file. Spectrum saving in the logger file is defined by activation / deactivation in the **Spectrum** position by means of the < >, < > push-buttons.



## 12.6. Display options in FFT analysis mode

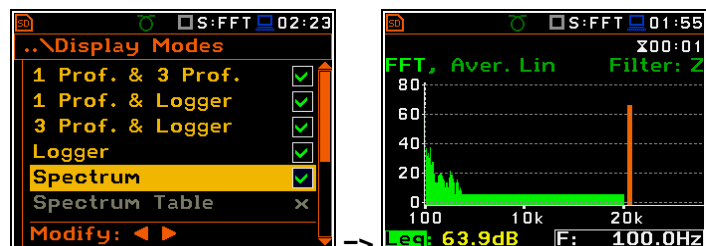
The **Display** list is used for setting the various parameters, which are mainly dedicated for the control of the display. The following windows contain the elements that influence the presentation of the results of **FFT** analysis:

<b>Display Modes</b>	enables the user to select the mode of the presentation of the <b>FFT</b> spectra;
<b>Display Scale</b>	enables the user to change the scale of the vertical and horizontal axis of the spectra presentation, switch on or off the grid and autoscale;
<b>Spectrum View</b>	enables the user to choose the type of the spectrum to be presented;
<b>Logger View</b>	enables the user to select and present the spectra results stored in the logger files.

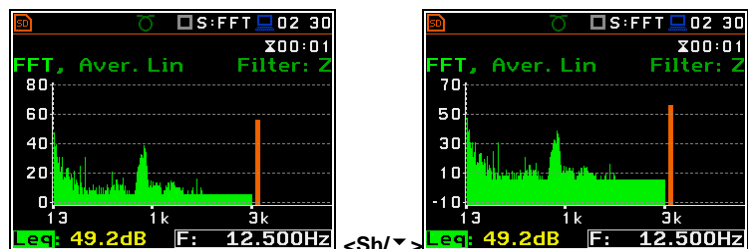
## 12.7. Presentation of FFT analysis results

The **Spectrum** position of the **Display Modes** list is accessible for the **FFT** function.

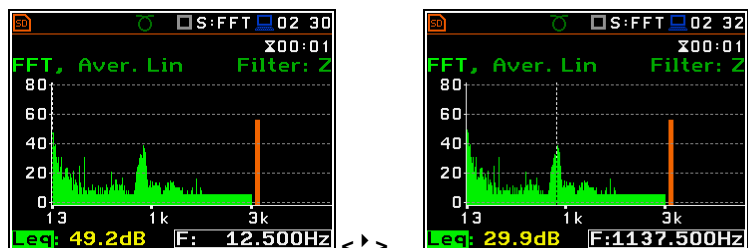
When the **Spectrum** mode is switched on the measurement screen in the **Spectrum** visualisation mode is shown here. **Spectrum Table** mode is not available.



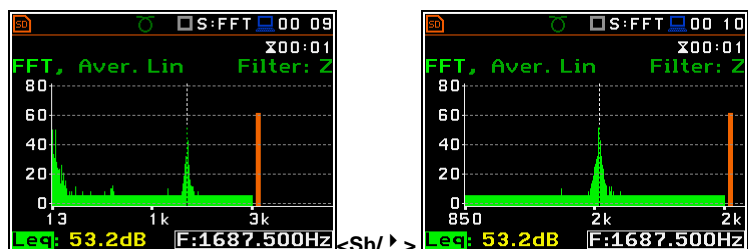
The user may shift the Y-axis during the spectrum presentation after pressing the **<Shift>** and **<^>** (or the **<Shift>** and **<v>**) push-buttons.



The user may change the cursor position by means of the **<^>**, **<v>** push-buttons. The frequency and appropriate value are presented in the line below the plot.



The user may zoom in/out the frequency scale at the cursor position by means of the **<^>**, **<v>** push-buttons, pressed with **<Shift>**.



## 12.8. Setting the scale of spectrum presentation - Scale



The **Display Scale** sub-list enables the user to change the scale in the available modes of graphical presentation of the measurement results and to switch the grid on or off.

### Setting the scale of the measurement results presentation

The **Scale** position is accessible only in case of Vibration measurement modes. Two options are available: **Lin** (linear) and **Log** (logarithmic). In case of **Lin** the graphical presentation and the units are linear. In case of **Log** graphical presentation is given in the logarithmic scale and the measurement results are expressed in decibels (the result is related to the values set in the **Reference Levels** (path: <Menu> / Auxiliary Setup / Reference Levels)).

In the case of the Sound measurements the **Scale** position is not active. All results are presented in dB.

### Scaling the vertical axis of the graphical mode presentation – Dynamic

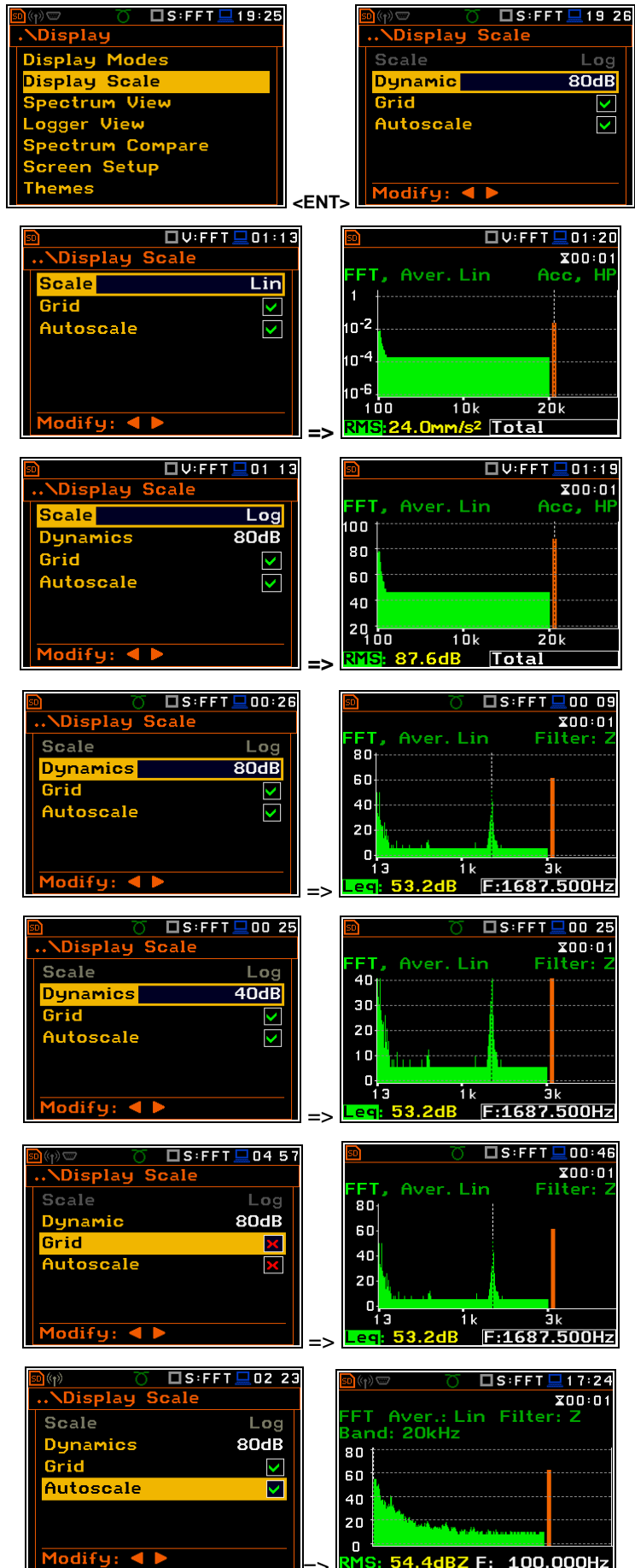
The **Dynamic** position enables the user to select the required dynamic range scaling of the spectrum presentation. It is possible to select the range from the set: **10dB**, **20dB**, **40dB** and **80dB**. In another words the user may obtain double, four and eight times the expansion of the vertical axis (as the default the vertical axis corresponds to 80 dB, after expansion it corresponds to 40 dB, 20 dB and 10 dB – respectively). Additional display scales of **100dB** and **120dB** are also available for FFT spectra.

### Switching the grid on/off

The **Grid** option enables the user to switch on or off the horizontal grid lines in the spectrum presentation mode.

### Switching the automatic Y-scale adjustment on/off

The **Autoscale** position switches on the automatic adjustment of the Y scale.



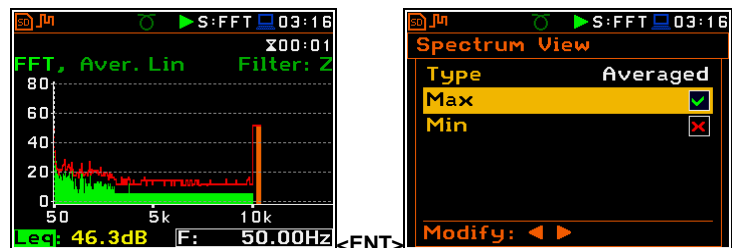
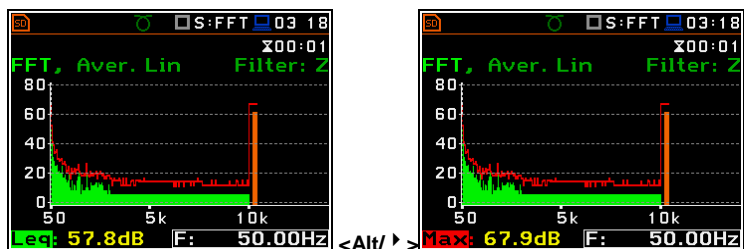
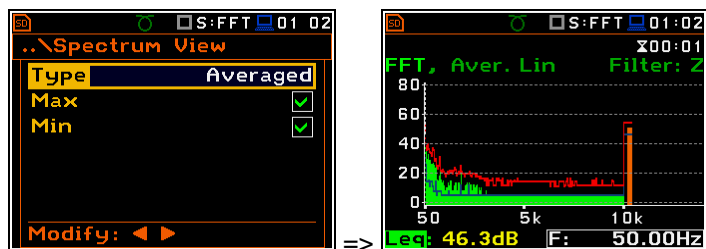
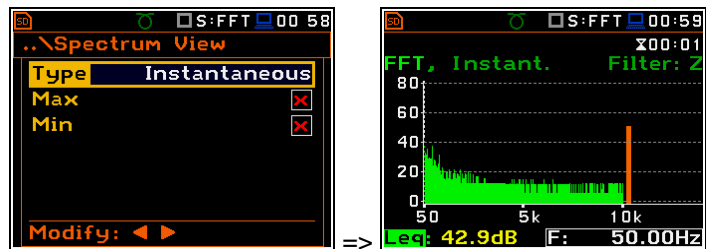
## 12.9. Setting the parameters of the spectrum presentation - Spectrum View

The user can select the different spectra to be visible on the display in the **Spectrum View** window (path: <Menu> / Display / Spectrum View). In the **Spectrum View** window the following spectrum types may be selected: **Averaged**, **Instantaneous**, **Max** or **Min**. The **Max** or **Min** spectra can be also superimposed on the **Averaged** or **Instantaneous** spectra.

When the **Averaged** or **Instantaneous** spectrum is selected the user can additionally switch on or off the presentation of the **Max** and/or **Min** values for every displayed spectrum band by placing or replacing the special character in the inversely displayed line using the <^>, <v> push-buttons.

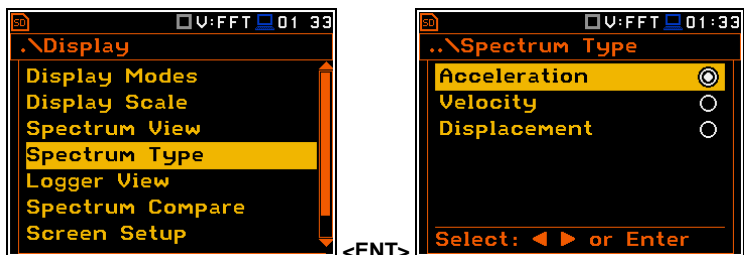
To switch the cursor to read the **Max** or **Min** values the user should select the field in the lower left hand corner of the display by means of the <^>, <v> push-buttons. Then select the appropriate value by means of the <^>, <v> push-buttons pressed together with <Alt>.

The view of the spectrum screen can be adjusted quickly without the measurement to be stopped. After press the <ENTER> push-button the **Spectrum View** list is displayed. The user may make necessary adjustments and return to the **Spectrum** view after confirmation of the changes by pressing the <ENTER> push-button.



## 12.10. Selection of the Spectrum Type in Vibration mode - Spectrum Type

The user can select the different type of vibration spectrum to be presented on the display in the **Spectrum Type** window (path: <Menu> / Display / Spectrum Type). The **Spectrum Type** position is available only for Vibration modes and the following spectrum types can be selected in the **Spectrum Type** window: **Acceleration**, **Velocity** or **Displacement**.



### 13. RT 60 MEASUREMENT OF THE REVERBERATION TIME

The **RT 60** analysis mode is an optional function of the SVAN 979 instrument, which provides reverberation time calculation for 1/3 octave bands (from 31.5 Hz to 10 kHz) and three total RMS levels (**A**, **C** and **Z** weighted). Whole measurement process and calculations implemented in the SVAN 979 instrument fulfil the ISO 3382 standard.

The reverberation time of the room can be obtained with the use of the SVAN 979 instrument by two measurement methods: **Impulse** (Impulse Response Method) and **Decay** (Interrupted Noise Method). The selection of the method depends on the type of the sound source utilized by the user. The **Impulse** method is designed for measurement utilizing the impulse sound source (like pistol shot, petard explosion), whereas the **Decay** method is intended for measurements when room is excited by broad or narrow band sound noise source (usually pink noise). For more details about the measurement and calculation process see Appendix H.

The reverberation time analysis applied in the instrument consists of two parts:

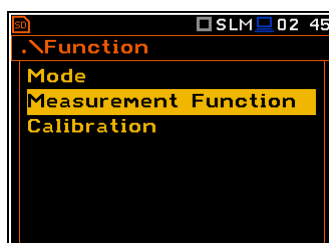
1. The measurement part during which the acoustic response of the room is registered.
2. The calculation part during which the reverberation time (**EDT**, **RT 20**, **RT 30** and **RT User**) is calculated for the measured room response.



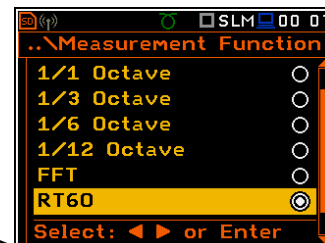
**Notice:** It is recommended to familiarize with the Appendix H before proceeding. This chapter describes only the navigation of the instruments, whereas Appendix H depicts the definitions and description of the reverberation time measurement.

#### 13.1. Selection of RT 60 function

In order to select the **RT 60** analysis function the user has to enter the **Function** list by pressing the **<Menu>** push-button, then select the **Function** text and press **<ENTER>**. Then, the user has to open the **Measurement Function** window highlight the **RT 60** line and press **<ENTER>**.



<ENT>

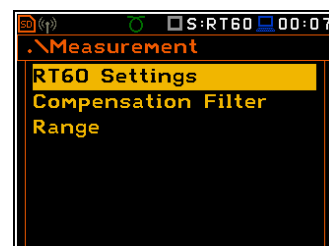


**Notice:** It is not possible to change the current function during live measurements. In this case the instrument displays for about 2 seconds the text: "Measurement in Progress". In order to change the current measurement function the instrument must be stopped!

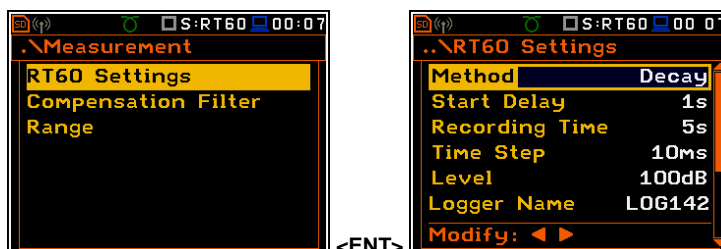
#### 13.2. Setting the RT60 parameters

The execution of **RT60** function depends on a certain number of the parameters, which can be set in the different lists of the **Measurement** menu: **RT60 Settings**, **Compensation Filter** and **Range**.

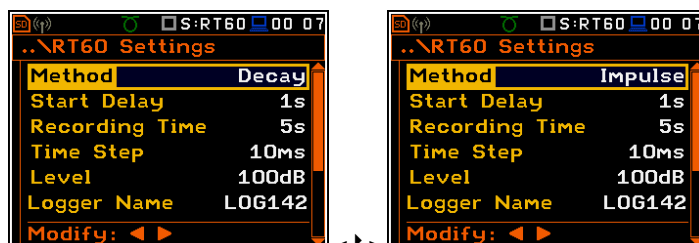
Positions **Compensation Filter** and **Range** are the same as for other instrument's functions (see. Sections 5.6 and 5.7 of this manual).



The **RT60 Settings** list enables the user to select the method for **RT60** calculation, select the name of the logger file, where the registered data will be collected, and other parameters for **RT60** calculation.



The **Method** position enables the user to choose the method for **RT60** calculation: **Decay** or **Impulse**. Both methods are described in the Appendix H.

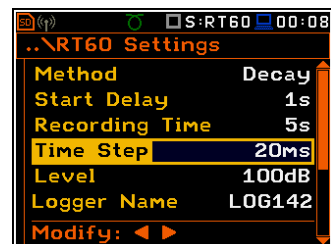
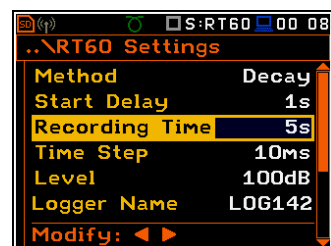


The **Start Delay** position defines the delay period from the moment the **<Start/Stop>** push-button is pressed to the start of the actual measurement.

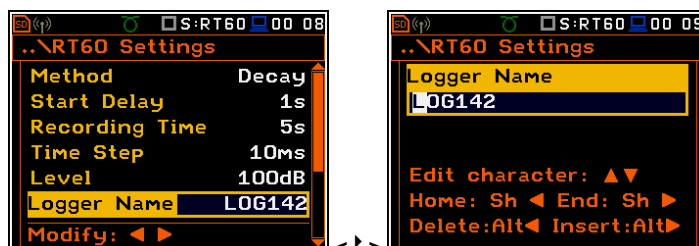
The **Recording Time** position defines the recording time of the measurement data (sound pressure level decay curve). The data acquiring starts in the moment of the trigger condition appearance. The recording time can be set in the range **1 ÷ 30 s**.

The **Time Step** position defines the time-step of data registration (sound pressure level) in the logger. The parameter value can be selected from the raw: **2, 5, 10, 20, 50, 100 ms**.

The **Level** position .... In the **IMPULSE** method the trigger condition appears when the **TOTAL** sound pressure level exceeds the defined by the user threshold **LEVEL** value. The parameter can be set in the range **24 ÷ 136 dB** with **1 dB** step (**100 dB** default value). For the **DECAY** method is **only for indicating purpose** (the user cannot select anything) that the measurement will start when the total sound level value decreases by **10 dB**

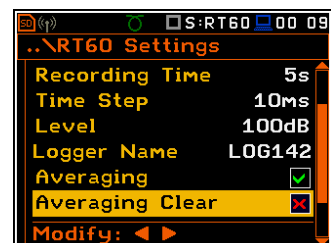


The **Logger Name** position enables the user to define the name of the logger file in which the data of the **RT60** analysis will be recorded. The name can be up to eight characters long. After pressing the **<F>**, **<B>** push-buttons, the special window with text editing function is opened.



The **Averaging** position enables the user to switch on the averaging of the reverberation time results from several measurements. When this option is **On** the additional visualization level **0** appears on the display after each measurement. If this option is **Off** then after taking the measurement the visualization level **1** appears on the display

The **Averaging Clear** position enables the user to switch on resetting of the averaging process. The whole averaged results are lost if not saved.

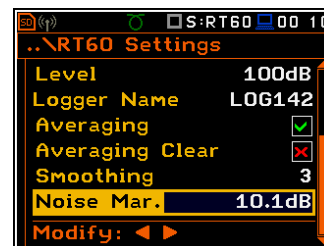


The **Smoothing** position enables the user to set the number of samples, which are taken to averaging process of the sound pressure level decay curve. **Notice: this parameter influences the reverberation time results.** The parameter can be set in the range  $0 \div 15$  with 1 sample step (default value is 3 samples).

The **Noise Mar.** position enables the user to set the margin value to the calculated noise level (for more detail see **Appendix H**). This parameter can be set in the range  $0 \div 20$  dB with 0.1 dB step (default value is 10 dB).



**Notice:** If the measurement have to fulfilled the **ISO 3382** standard requirements the noise margin is required to be set to 10 dB (or greater value).



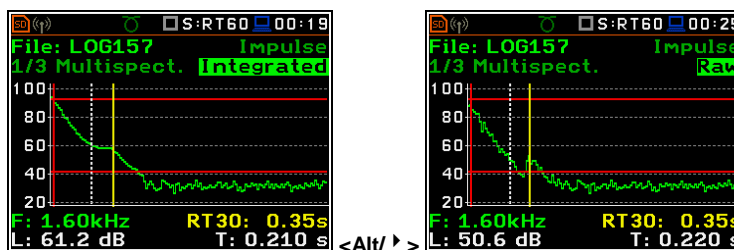
### 13.3. Setting the result display mode

The **Display Modes** list of the **Display** menu enables the user to select the type of data displayed during the **RT60** calculation.

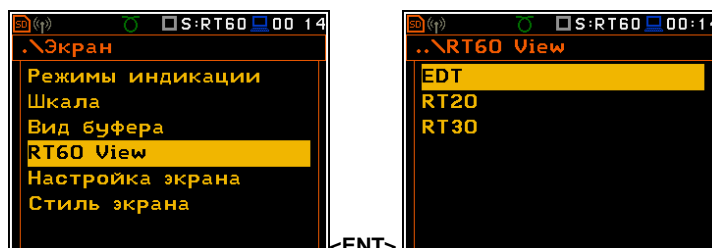


Time data can be viewed as a **Raw Data**, **Smoothed Data** (or **Integrated Data** in case of **Impulse** method).

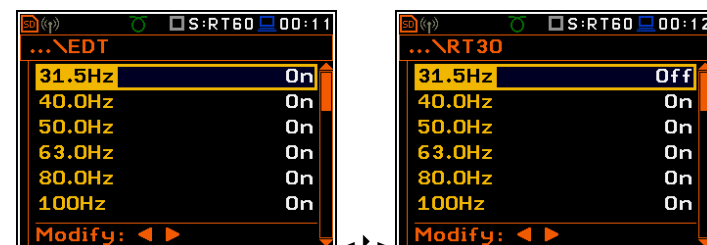
The user may also switch between different data view modes during measurement in the presentation display mode. For this purpose it is necessary to set the cursor on the field with **Raw**, **Smoothed** or **Integrated** text (at the right upper corner of the display) and change it's content with the **<Alt>** and **<F>**, **<B>** push-buttons.



The **RT60 View** list of the **Display** menu enables the user to select which reverberation time results (**EDT**, **RT 20** or **RT 30**) and to which 1/3 octave bands will be presented on the display after measurement.



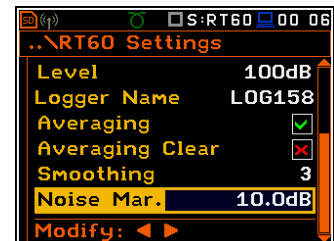
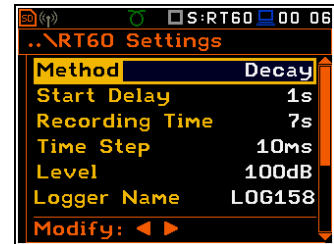
Each **EDT**, **RT 20** or **RT 30** list contains lines with 1/3 octave central frequency parameter, which can be set on **On** or **Off**. If any of 1/3 octave band is switched off the relevant results will not be presented on the result display.



### 13.4. Start RT60 measurements

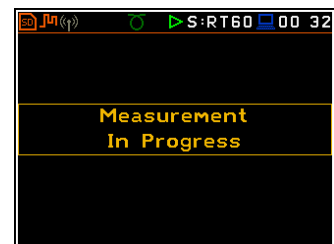
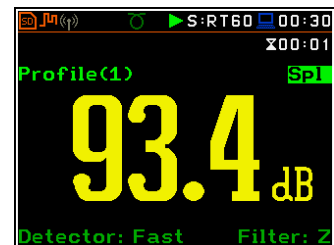
### Measurements with the use of Decay method

- Set parameters for **Decay** RT60 measurements. Most used setup is presented below.
  - **Method:** Decay
  - **Recording Time:** 7s
  - **Time Step:** 10ms
  - **Averaging:** On
  - **Smoothing:** 3
  - **Noise Mar.:** 10.0dB
- Place the sound power source in the measured room (for the sound power source location - see the reverberation time measurement ISO standard).
- Place the microphone in one of the selected measurement points (for the measurement points location see the reverberation time measurement ISO standard).



**Notice:** The default measurement time of the decay curve registering (**Recording Time**) is 7 seconds. It can be insufficient in some applications. It is recommended to set this value to be at least two times longer than expected reverberation time. For details see Appendix H.

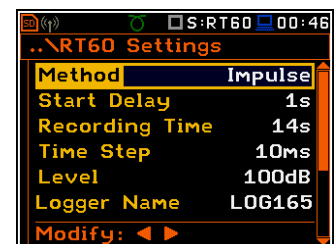
- Switch on the sound power source.
- Start the measurement process by pressing the **<Start/Stop>** push-button. The display indicates that the instrument is waiting for the trigger condition fulfilment.
- Switch off the sound power source (the source should work enough long to obtain the acoustic field stabilisation). After the trigger condition fulfilment the instrument starts to collect data.
- After the data recording process ends, the instrument starts the calculation of the reverberation time results. During this process the message "Reading Logger..." appears.
- To save results press the **<Save>** push-button or use the **File** menu option.



**Notice:** It is necessary to switch on the sound source before starting the measurement because of the trigger requirements (for more details see Appendix H). If there it is necessary to start the instrument before switching on the sound source it is recommended to use the higher **Start Delay** value.

### Measurements with the use of Impulse method

- Set parameters for **Impulse** RT60 measurements. Most used setup is presented below.
  - **Method:** Impulse
  - **Recording Time:** 7s
  - **Time Step:** 10ms
  - **Level:** 100dB
  - **Averaging:** On
  - **Smoothing:** 3
  - **Noise Mar.:** 10.0dB





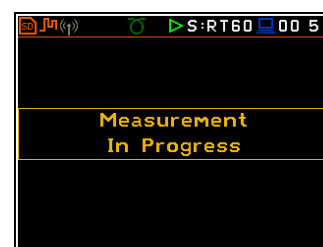
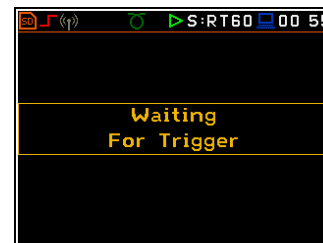


**Notice:** The default measurement time of the decay curve registering (**Recording Time**) is 7 seconds. It can be insufficient in some applications. It is recommended to set this value to be at least two times longer than expected reverberation time. For details see Appendix H.



**Notice:** The proper value of the sound level trigger threshold should be set well above the background noise and significantly below the maximum sound level emitted by the impulse source.

- Place the microphone in one of the selected measurement points (for the measurement points location see the reverberation time measurement ISO standard).
- Start the measurement process by pressing the **<Start/Stop>** push-button. The display indicates that the instrument is waiting for the trigger condition fulfilment.
- Fire the impulse sound power source. If the trigger condition is fulfilled the instrument starts to collect data.
- After the data recording process ends, the instrument starts the calculation of the reverberation time results. During this process the message "Reading Logger..." appears.
- To save results press the **<Save>** push-button or use the **File** menu option.



**Notice:** During the data collections in the investigated room all other sources of sound should be suppressed to not affect the measurements.

### 13.5. Visualization of the RT 60 measurements results

The **RT60** measurement results for all 1/3 octave bands and three Total values can be viewed in three different presentation modes:

- Table of **EDT**, **RT20**, **RT30** and **User** results;
- Bar plot of **EDT**, **RT20**, **RT30** and **User** results;
- Plot of sound pressure level decay curves.

The user may switch between the presentation modes by means of the **<Alt>** and **<◀>**, **<▶>** push-buttons.

#### Table of RT60 results

The table presents the results of reverberation time for different **RT60** results:

- EDT** - early decay time;
- RT 20** - reverberation time calculated with 20 dB dynamics;
- RT 30** - reverberation time calculated with 30 dB dynamics;
- User** - reverberation time, calculated with the user defined dynamics.

RT60	EDT	RT20	RT30
315Hz	0.16s	***	***
400Hz	0.20s	0.34s	***
500Hz	0.17s	0.34s	***
630Hz	0.23s	0.30s	0.34s
800Hz	0.27s	0.30s	0.32s
1.00k	0.08s	0.20s	0.24s

RT60	RT20	RT30	User
315Hz	***	***	***
400Hz	0.34s	***	***
500Hz	0.34s	***	***
630Hz	0.30s	0.34s	***
800Hz	0.30s	0.32s	***
1.00k	0.20s	0.24s	***

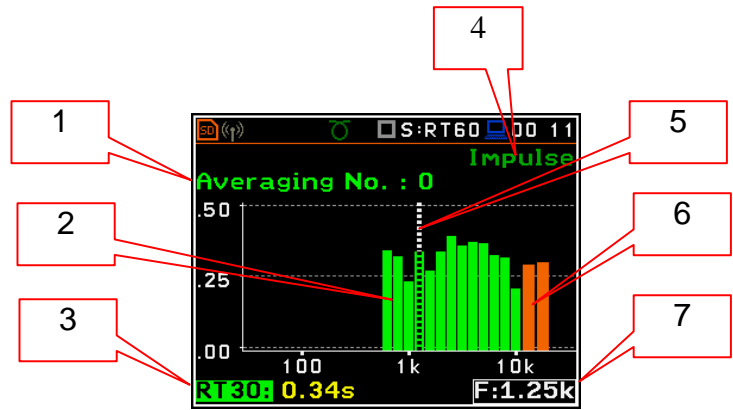


**Notice:** If " \* \* " text appears in the RT indicator field it means that for this 1/3 octave band with the selected parameters (**Noise Mar.**) the required measurement conditions were not fulfilled to obtain the results (for more details see Appendix H).



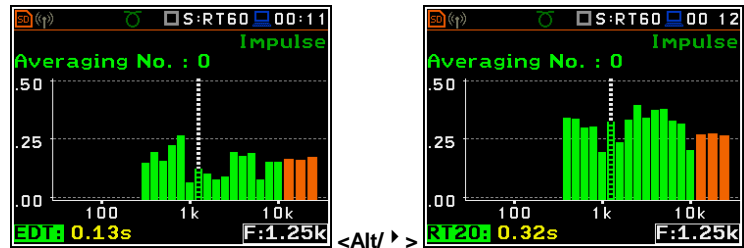
### Bar plot of RT60 results

1. Number of averaged results
2. RT 1/3 octave plot
3. Name of the RT result and its value
4. Used RT60 calculation method
5. Cursor position
6. RT results for Total values
7. Cursor position value (central 1/3 octave band frequency)



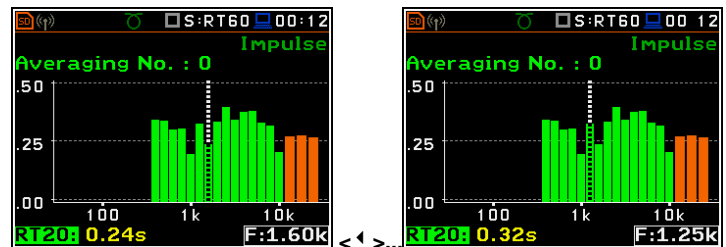
### Changing the RT result

When the field 3 is active the **RT60** analysis result can be changed after pressing the <◀> and <▶> push-buttons together with <Alt>.



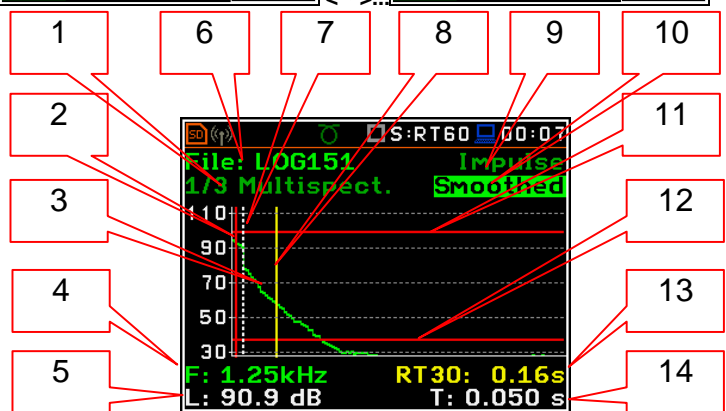
### Changing the cursor position

The user may change the cursor position by means of the <◀>, <▶> push-buttons.



### Sound pressure decay curve plot

1. Name of ...
2. T0 marker position
3. Decay curve plot
4. Central frequency of selected by cursor 1/3 octave band
5. Result value (SPL) for the cursor position
6. Name of the logger file
7. Cursor position
8. T1 marker position
9. RT60 method
10. Type of data displayed: **Raw**, **Smoothed** or **Integrated**
11. Calculated steady upper sound level value
12. Calculated steady lower sound level value
13. RT result (**RT30**, **RT20**, **EDT** and **RT User**) with calculated reverberation time
14. Cursor measurement time position

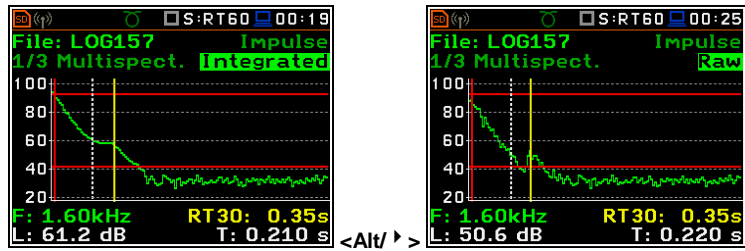


T0 marker position is used as a starting point to all three (and the **RT User** also) reverberation time calculations.

On the display T1 marker position is labelled (indicator **A7**) as **EDT**, **RT 20** or **RT 30** according to which the most restricted definition of the RT condition is fulfilled.

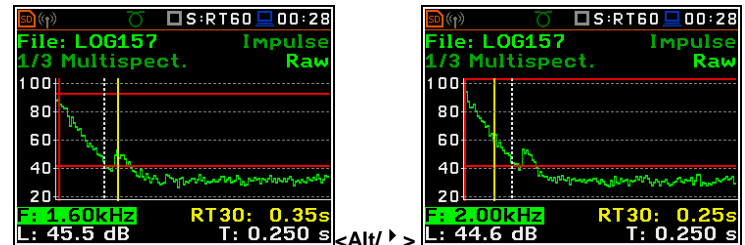
### Changing the data type

When the field 9 is active the type of data displayed (**Raw**, **Smoothed** or **Integrated**) can be changed after pressing the <◀> and <▶> push-buttons together with <Alt>.



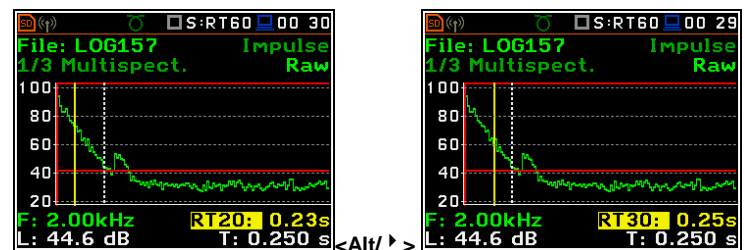
### Changing the 1/3 octave band

When the field 3 is active the central frequency of 1/3 octave band can be changed after pressing the <◀> and <▶> push-buttons together with <Alt>.



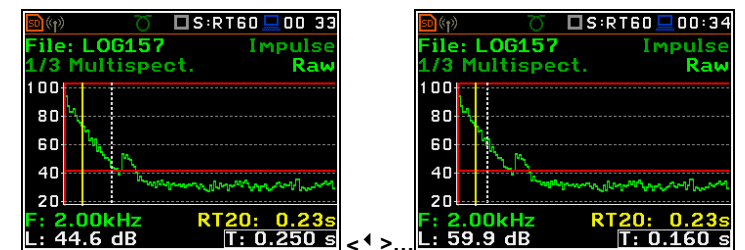
### Changing the RT function

When the field 12 is active the **RT60** analysis function can be changed after pressing the <◀> and <▶> push-buttons together with <Alt>.



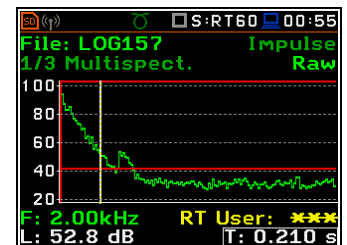
### Changing the cursor position

When the field 13 is active the user may change the cursor position by means of the <◀>, <▶> push-buttons.



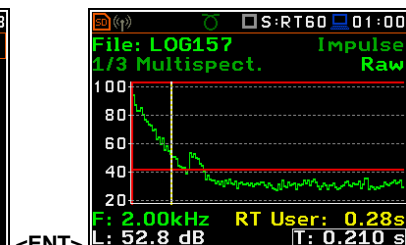
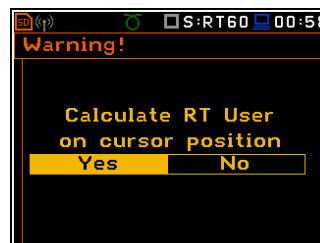
### RT User reverberation time calculation

1. Select the 1/3 octave band or one of the total levels for user reverberation time calculation process.
2. Set the position of the marker T1.



**Notice:** The marker has to be located on the right side of the T0 marker but not in the noise background region (for more details see Appendix H).

3. When the marker position is located press <ENTER>, then select **Yes** field and press <ENTER> again.
4. The **RT User** result will be calculated and presented in the field 13, as well in the Table and 1/3 octave bar plot.



## 14. TONE MEASUREMENT - Tonality

The method applied in SVAN979 for assessing the audibility of tones in noise has three steps:

- narrow-band frequency analysis (FFT);
- determination of the average sound pressure level of the tone(s) and of the masking noise within the critical band around the tone(s);
- calculation of the tonal audibility (**L<sub>ta</sub>**) and the penalty (**K**).

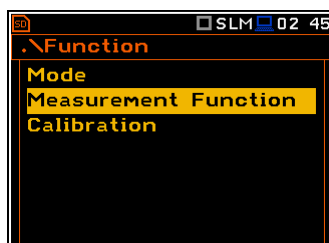
This method is in accordance with the ISO 1996-22:2007(E) standard.



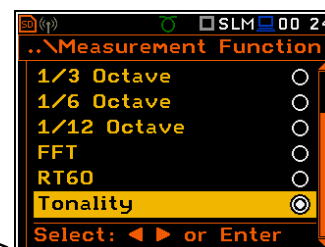
**Notice:** It is recommended to familiarize with the Appendix I before proceeding. This chapter describes only the navigation of the instruments, whereas Appendix I describes the Objective Method for Assessing the Audibility of Tones in Noise applied in the SVAN979 instrument.

### 13.1. Selection of Tonality function

In order to select the **Tonality** analysis function the user has to enter the **Function** list by pressing the **<Menu>** push-button, then select the **Function** text and press **<ENTER>**. Then, the user has to open the **Measurement Function** window highlight the **Tonality** line and press **<ENTER>**.



<ENT>

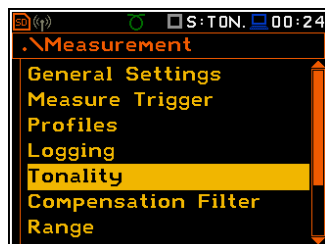


**Notice:** It is not possible to change the current function during live measurements. In this case the instrument displays for about 2 seconds the text: "Measurement in Progress". In order to change the current measurement function the instrument must be stopped!

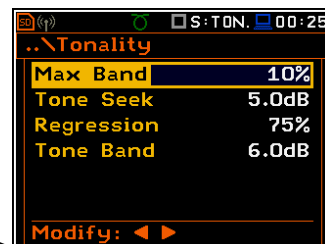
### 13.2. Setting the parameters of the Tonality function

The execution of **Tonality** function depends on a certain number of the parameters, which can be set in the different lists of the **Measurement** menu.

The **Tonality** list contains specific parameters of **Tonality** function.



<ENT>

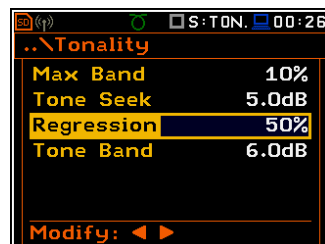
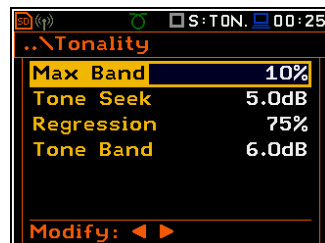


**Max Band** (range 5%- 25%) is maximum tone bandwidth relative to critical bandwidth; all local maxima in the spectrum with tone bandwidth smaller than Max Band of the width of the surrounding critical band are defined as "tones" (usually set to 10%).

**Tone Seek** (range 1.0dB – 5.0dB) criterion defining noise pauses within which tones are found (for smooth spectra value of 1dB is fine, for irregular spectra (e.g. spectra with short averaging time) values of 3dB or 4dB give better results).

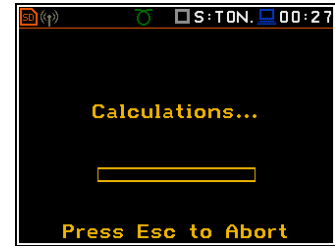
**Regression** (range 50% – 100%) is a linear regression range relative to critical bandwidth; linear regression is used to find masking noise level (usually set to 75%).

**Tone Band** (range 1.0dB – 6.0dB) is a criterion for determining tone bandwidth (usually set to 3dB).



### 13.3. Start Tonality measurements

SVAN979 performs Tonality measurements together with SLM measurements. To start the measurements the user has to press the **<Start/Stop>** push-button. After the measurement ends, the instrument starts the calculation of the tonality results. During this process the message "Calculations..." appears.



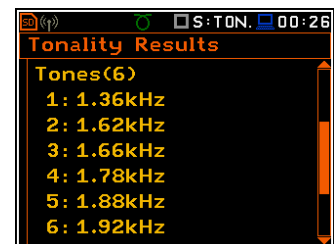
### 13.4. Visualization of the Tonality measurements results

The **Tonality Results** window presents the results of Tonality analysis:

- Penalty (**K**) - a value to be added to the value of **Laeq** for the noise source to give the tone a corrected rating level [dB];
- Critical Band;
- Tones - a list of tones causing penalty;
- Tone level (**Lpt**) - total sound pressure level of tones in the critical band [dB];
- Noise level (**Lpn**) - total sound pressure level of the masking noise in the critical band [dB];
- Tonal audibility (**Lta**) - an audibility of tones in the critical band [dB re MT].



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